MARINE CONSERVATION FINANCE

Funding the Big Blue:

Offshore and High Seas Marine Protected Area Finance

6 September 2021

Prepared for
Pew Charitable Trusts under Contract ID # 34059

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Suggested Citation: Walsh, M., R. Barr, and C. Sundberg. In prep. Funding the Big Blue: Offshore and High Seas Marine Protected Area Finance. Prepared for The Pew Charitable Trusts under Contract ID # 34059.

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Abbreviations and Acronyms

ABNJ	Area Beyond National Jurisdiction
ADB	Asian Development Bank
BIOFIN	Biodiversity Finance Initiative
CBD	Convention on Biological Diversity
CCIF	Conservation and Community Investment Forum
CFA	Conservation Finance Alliance
CSR	Corporate Social Responsibility
CTF	Conservation Trust Fund
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization of the United Nations
FOA	Friends of Ocean Action
GCF	Global Conservation Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
HMPA	High Seas MPA
IUCN	International Union for Conservation of Nature
IUU	Illegal, Unreported and Unregulated
LSMPA	Large-Scale Marine Protected Area
MPA	Marine Protected Area
MSP	Marine Spatial Planning
NGO	Non-Governmental Organization
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
OMPA	Offshore Marine Protected Area
O/HMPA	Offshore and High Seas MPA
PES	Payment for Ecosystem Services
PFP	Project Finance for Permanence
SeyCCAT	Seychelles Conservation and Climate Adaptation Trust
SIDS	Small Island Developing State
TEEB	The Economics of Ecosystems and Biodiversity
UNCLOS	United Nations Convention on the Law of the Sea
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	The United Nations Development Programme
UNEP	The United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
WCMC	World Conservation Monitoring Centre
VMS	Vessel Monitoring System
WTP	Willingness To Pay
WWF	World Wildlife Fund

Acknowledgements

Funders

Support for this research was provided by The Pew Charitable Trusts under Contract # 34059. The views expressed herein are those of the authors and do not necessarily reflect the views of The Pew Charitable Trusts.

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Peer review was provided by Esteban Brenes, Director of Conservation Finance at World Wildlife Fund, and Klaas-Pieter de Vos, Ocean Fox Advisory.

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Executive Summary

Introduction. The ocean is vital to human well-being and the global economy. The ocean provides food security and protein, global biodiversity, climate regulation, and contributions to cultural and social identities. Despite these values, the ocean is under immense pressure from pollution, overfishing, climate change, and extraction, undermining both ocean values and the global economy. Marine Protected Areas (MPAs) are a critical tool to manage and preserve marine ecosystem services and yield economic benefits. In the last decade, a strong trend has emerged for the designation of large-scale Offshore and High seas MPAs (O/HMPAs).

Finance is critical to the long-term success of MPAs, yet finance remains fragmented and limited. Without adequate financing, MPAs are at risk of being little more than paper parks that do not deliver additionality or preserve marine values. Finance for O/HMPAs is even more constrained than for coastal MPAs. Therefore, the purpose of this white paper is to analyze cost drivers and finance options for O/HMPAs.

O/HMPA Finance Principles. Ten principles of MPA finance are synthesized from the literature to guide O/HMPA finance. The principles are the same for all MPAs, regardless of location. In addition, indicators for each principle are recommended to support tracking of progress towards effective MPA finance. Characteristics of O/HMPAs that make them unique and will impact on both costs and finance options are discussed, including governance, remoteness, size, activities, and biological productivity.

O/HMPA Costs. Before considering how to finance O/HMPAs, it is vital to first assess costs, including establishment, operational, and opportunity costs (although the latter is largely out of scope for this study). The effect that O/HMPA characteristics have on cost is complex; while some characteristics have a positive relationship with costs (higher biological productivity is associated with higher costs), other characteristics have an inverse relationship (larger MPAs may have lower personnel costs due to economies of scale). It is not yet possible to determine the relative proportion of costs for basic budget categories such as personnel, transport, stakeholder engagement, monitoring & enforcement, and data / research; the relative costs can only be determined on a case-by-case basis (see Case Studies). There is insufficient data to develop rules of thumb or average costs. While cost modelling is not currently possible, it is an important future direction to aid the establishment of effective O/HMPAs. Cost efficiencies, such as the use of innovation and technology for fisheries enforcement, may reduce costs and therefore minimize the funding gap.

O/HMPA Users and Beneficiaries. O/HMPAs provide a large range of ecosystem services to users and beneficiaries. Commercial users may include entities across value chains in fishing, tourism, aquaculture, shipping, mining, offshore oil & gas, offshore renewable energy, marine bioceuticals, and shipping industries. Commercial beneficiaries may include impact investors, venture capitalists, equity investors,commercial banks, and insurers who are operating in the above industries. Non-commercial users and direct beneficiaries include culturally-connected

populations, global populations, and for OMPAs – recreational fishers, recreational swimmers / snorkelers, national governments and populations. Indirect and global beneficiaries are very important for remote MPAs and may include regional and global populations who benefit from regulating services (carbon sequestration, water cycling, nutrient cycling) and supporting services (habitat for diverse marine life, migratory species, and genetic diversity).

O/HMPAs are constrained by the lack of coastal community access, fewer potential revenue sources and finance mechanisms. This is particularly true for HMPAs who may not have direct connections to local governments, but may rely on theoretical or emotional connections. Scientific evidence is increasing to quantify the spillover benefits from HMPAs to adjacent sovereign waters; this may enable theoretical connections to become quantified and monetized connections in the near future.

O/HMPA Finance Mechanisms. While numerous finance mechanisms exist, selection of finance mechanisms depends on site-specific O/HMPA contexts. A global catalogue of conservation finance mechanisms has been filtered to identify mechanisms that are most relevant to O/HMPAs. Pre-feasibility of finance mechanisms can then be achieved by assessing the users and beneficiaries of the O/HMPA. If commercial activity exists in the MPA, commercial users may contribute through taxes, fees and royalties, offsets, fines and penalties. Commercial investors may contribute through credits, blue bonds, loans and equity. Non-commercial users and direct beneficiaries may contribute through public budgets, trust funds, donations, debt-for-nature swaps, sovereign wealth funds, payments for ecosystem services, project finance for permanence, and savings / impact bonds. Indirect and global beneficiaries may contribute through development aid, donations and trust funds. In general, for O/HMPAs, if commercial activities are permitted, it is advised that at least one finance mechanism come from commercial users and/or investors, and at least one finance mechanism from non-commercial users, direct beneficiaries, and/or indirect beneficiaries.

Rigorous feasibility analysis of short-listed mechanisms is required using ecological, social, cultural, economic, and legal criteria, some of which are summarized herein from best available sources. While the feasibility analysis steps are not different for O/HMPAs versus coastal MPAs, the outcomes are likely to be significantly different. There is no silver bullet finance mechanism that will work for all O/HMPAs. Case-by-case analysis will always be required.

O/HMPA Case Studies. Three case studies are used to explore potential fit of finance mechanisms to diverse O/HMPA contexts. By exploring the characteristics of the hypothetical case studies, an analysis is presented of potential users and beneficiaries, as well as recommended finance options for consideration.

For an OMPA within a SIDS EEZ, there are numerous users and beneficiaries as well as finance mechanisms to consider. The development of a finance facility to join and leverage at least three sources of funding is recommended. First, the government should raise domestic resources by developing taxes or fees for commercial uses such as tourism and fishing. Second, due to the developing nature of the country, development aid and philanthropic support from overseas

foundations and non-governmental partners is likely to be required. Third, the use of loans to both incentivize sustainable ocean sectors and also generate revenue would be a nice addition to the facility.

For an O/HMPA with transboundary issues and commercial fishing, the finance mechanism should draw from both offshore and high seas uses. As above, the government should raise domestic resources to support the O/HMPA from fisheries and shipping sectors. Without the direct non-commercial users and tourism industry, additional resources must be identified. For the high seas component, funding may be drawn from the shipping or undersea cable usage, or from donations from governments around the world. This may be easier to do, however, in a coordinated and global fund (see below).

Finance for a no-take HMPA is perhaps the most difficult. It is recommended that a global fund for HMPAs be designated, in coordination with the ongoing ABNJ negotiations, and drawing from both commercial fees and also government. In addition to the fees mentioned above, the fisheries sector, which benefits from spillover from the MPAs, could be asked to contribute. Government donations would need to be structured equitably, based on GDP, sustainable ocean economy size, or a similar variable.

Conclusions. As more and more O/HMPAs are costed, a database of cost estimates and actual expenditures should be built, paving the way for fine-tuning of the theoretical cost drivers, developing rules of thumb, and eventually developing cost models which will allow managers to input MPA attributes and output cost estimates. In turn, this will help MPA managers develop better finance strategies. For O/HMPAs, there are large potentials in using technologies such as satellites, drones, underwater acoustics and environmental DNA for conducting remote surveillance and science at a reduced cost.

Due to their remote nature, O/HMPAs can be outside of the consciousness of local and global populations, and it is imperative to strengthen the science and the advocacy around spillover benefits of HMPAs to adjacent nations, and on the quantifiable regional and global benefits provided by O/HMPAs.

Traditional trust funds, user fees, and fines remain essential. In most cases, innovative mechanisms should only be considered after strong, traditional mechanisms are in place to support core capacities. Many innovative finance mechanisms, such as blue bonds, loans and equity, may have a growing role.

O/HMPAs that are considered as part of a network of MPAs, rather than a standalone park, may be more successful at achieving financial sustainability. Without a network approach, HMPAs in particular will require significant support to achieve financial sustainability.

Finally, O/HMPA financial sustainability will require the commitment from all stakeholders to ongoing financial planning. Financial sustainability is not an endpoint, but rather a cycle of strategic and participatory planning. With a phased, iterative approach, O/HMPAs can re-assess

costs and threats as global contexts change; decrease costs as new technologies emerge; learn from innovative conservation finance mechanisms being trialed in terrestrial contexts and adapt them to the ocean environment; determine which management interventions are most effective and therefore most worthy of limited resources; and stack layers of finance mechanisms upon each other to diversify and de-risk funding flows. Achieving financial sustainability for O/HMPAs will not be easy, but protection of pelagic biodiversity and blue water ocean health is essential to life on earth.

1. Introduction

“How inappropriate to call this planet Earth when it is clearly Ocean.” - Arthur C. Clarke

We live on a blue planet in which the oceans sustain life, yet more is understood about the solar system than our deep seas. Understanding and protection of the ocean is growing, yet most efforts are focused on the thin blue line of coastal marine habitat that hugs our shorelines - the tiny slice of the ocean that we can easily access. But what about the big blue beyond what we can see from our shores? The waters outside of the coastal zone are vital for planetary function, biodiversity, and human well-being. Funding the protection of these critical habitats requires urgent attention.

The purpose of this paper is to support improved finance for O/HMPAs by assessing cost drivers and finance options. The research has been funded by The Pew Charitable Trusts, and the target audience of the white paper is practitioners who are planning, designating, implementing, and funding O/HMPAs.

1.1 The Value and Vulnerability of the Ocean

The ocean is vital to human well-being and the global economy (Stuchtey et al, 2020). Comprising 97% of the Earth’s water, the ocean contains more than 90% of all biologically useful habitats (Day et al, 2015). Fish are vital for global food provision, accounting for approximately 20% of animal protein consumed by 3 billion people, and up to 50% in some less developed countries (Food & Agricultural Organization; FAO, 2018) and if managed sustainably, ocean resources could supply over six times more than it does today (Costello et al, 2019). Covering 70% of the earth’s surface area, the ocean also plays a major role in climate regulation through photosynthesis and transportation of heat from the equator to the poles (Day et al, 2015). The ocean and its marine species support a range of economic activities, such as fisheries, tourism, renewable marine energy, and marine transport. The ocean-based economy is growing rapidly and is projected to reach at least USD 3 trillion in 2030 (Organization for Economic Co-operation and Development; OECD, 2016). The portion of the ocean economy which is sustainable and supportive of ocean health is hereafter termed the “blue economy.”

Moreover, the human relationship with the ocean is diverse and complex. It extends beyond these descriptive values to include larger contributions to cultural and social identity; a sense of place, spirituality, mental and bodily health, and human security (Hynes et al, 2018; Allison et al, 2020).

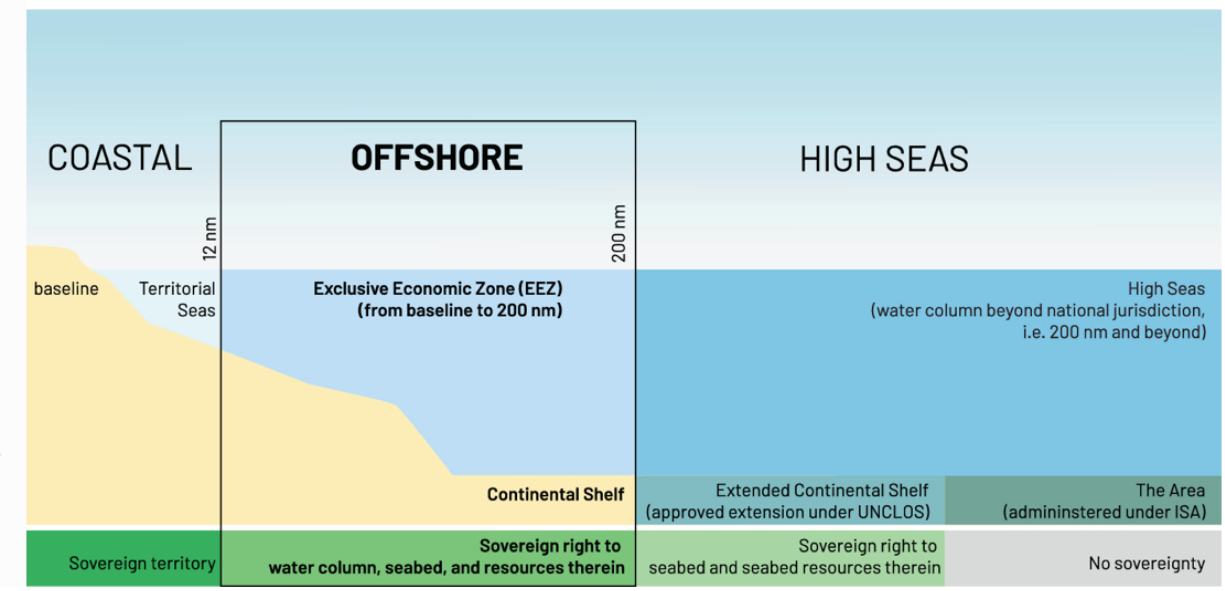
The ocean is under immense pressure from human impacts. Pollution, overfishing, climate change, extractive activities, and species introduction all contribute to putting increasing pressure on the ocean environment, thereby threatening its ability to provide ecosystem services to humans - today and in the future (Andrews et al, 2020a; Sumaila et al, 2020; Stuchtey et al, 2020). The costs for not conserving and sustainably using the ocean are high:

- ‘The total estimated cost of coastal protection, relocation of people and loss of land due to sea level rise is projected to range from about USD 200 billion to 1 trillion annually by 2100’ (Sumaila et al, 2020).
- Global commercial fish stocks support a USD362 billion global industry - but a third are currently being harvested at biologically unsustainable levels (FAO, 2020).This poses serious threats to global food security as millions of people in coastal communities, mostly in developing countries, depend on the fishing industry for their livelihoods and 50% of the world’s population relies on fish as their main source of protein (World Wildlife Fund; WWF).
- Invasive species cause an estimated USD 100 billion in economic damages to infrastructure, ecosystems and livelihoods each year (OECD, 2017; Sumaila et al, 2020).

1.2 Offshore and High Seas Waters

Two-thirds of the world’s oceans are in the **High Seas** (in Areas Beyond National Jurisdiction; ABNJs) and most of the remaining waters are **Offshore** (greater than 3 nautical miles offshore but within a country’s Exclusive Economic Zone; EEZ; see Figure 1).[1]

Figure 1: Conceptual definition of coastal, offshore, and high seas zones (adapted from Symonds et al, 2009)



The High Seas cover 43% of the earth’s surface and 64% of global ocean area, and are home to globally important marine habitats and species (Pew Charitable Trusts, 2015). The High Seas consist of highly dynamic, large pelagic environments, where huge volumes of water are moved around by tidal changes and currents; fish species move between different pelagic zones, or

[1] For a discussion on the terms used in this study, see Appendix 1. It is also noted that for the purposes of this study, we consider offshore areas to also include all islands - and their surrounding territorial seas - located further than 3 nautical miles from mainland.

between the High Seas and more coastal areas throughout their life cycles. Physical properties such as temperature are ever-changing, and productivity fluctuates daily and seasonally (Gubbay, 2006). Commercial fishers, the marine transport industry as well as extractive industries such as oil and gas, all rely on the High Seas; as do global populations who benefit from ecosystem services such as marine biodiversity, nutrient and water cycling, and carbon sequestration.

Offshore waters, lying between the High Seas and more familiar and accessible coastal waters, provide invaluable marine ecosystem services to national governments and global populations (Pauly & Alder, 2005). The benthic environment of offshore areas, due to its position on the continental shelf, contain diverse habitats and countless marine species, as well as commercially important mineral deposits.

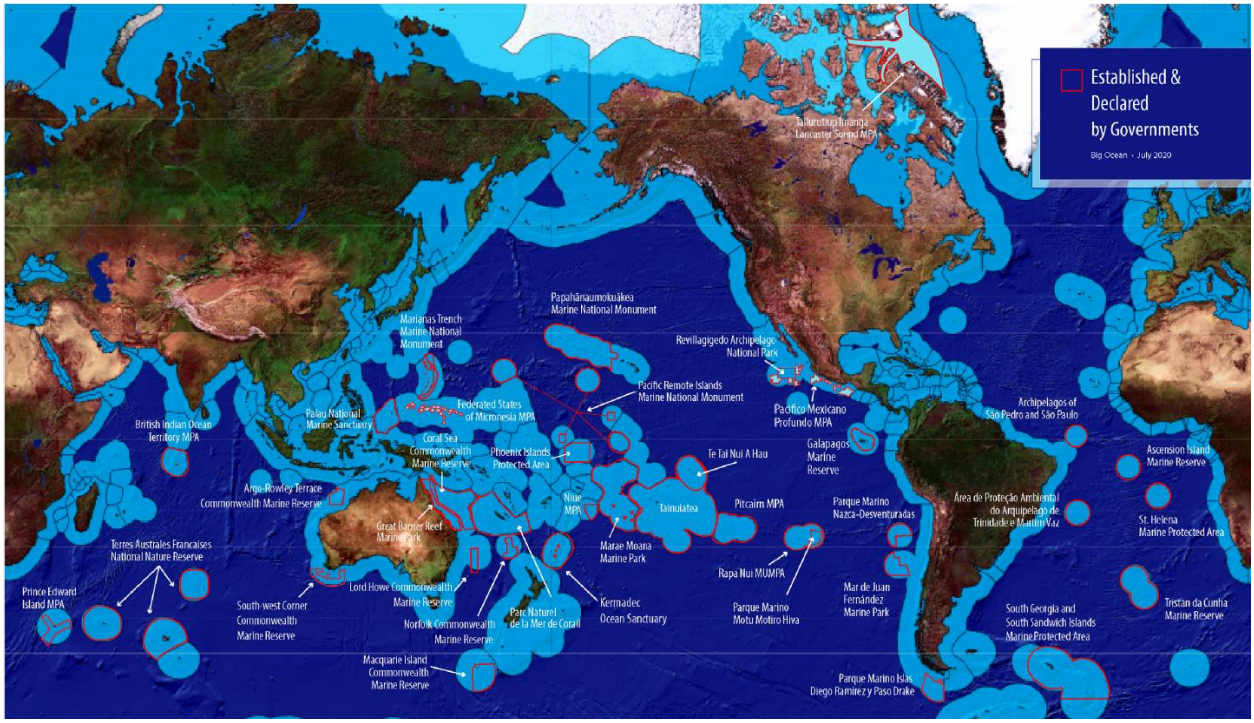
1.3 Protecting the Big Blue

Sustainable management of offshore and high seas marine areas is critical for the global conservation and sustainable use of biodiversity (Rogers et al, 2020). MPAs are a key tool in marine ecosystem management. The IUCN (1988) defines MPAs as 'any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment'. Conserving 20–30% of global oceans in MPAs has the potential to create 1 million jobs, generate fish catch worth USD 70–80 billion per year, and provide ecosystem services worth USD 4.5–6.7 trillion/year (UNEP-WCMC and IUCN, 2016).

In the past 10 years, global MPA coverage has been driven by the establishment of new Large Scale MPAs (LSMPAs; Lewis et al, 2017; see Figure 2), over 70% of which are in offshore or high seas environments. Yet, only 1.3% of the high seas are designated as MPAs today (Marine Conservation Institute, 2021). This study includes MPAs that are situated in both Offshore and High Sea areas.[2]

[2] For a list of O/HMPAs that fall under the scope of this study, see Appendix 2.

Figure 2: The world's current established LSMPAs (Andrews et al, 2020a)



1.4 Funding Gap

In addition to key factors such as governance, management capacity, and stakeholder engagement, adequate finance is critical to the long-term success of MPAs (Emerton et al, 2006; Bonham et al, 2014). Despite the fact that investing USD1 in ocean actions can yield at least USD5 in global benefits (Konar and Ding, 2020), funding for marine protection remains fragmented, limited by regulatory and capacity gaps, and constrained by complicated tenure and ownership (Sumaila et al, 2020).

A recent analysis of the funding gap to achieve Sustainable Development Goal #14: Life Below Water estimated a gap in the order of USD 149 billion per year (Johansen and Vestvik, 2020). Indeed, evidence is growing that MPAs may face the largest funding gap of all protected areas (Emerton et al, 2006; Lennox, 2012; Bos et al, 2015; Bohorquez et al, 2019; Andrews et al, 2020a). This lack of funding is further compounded by a high dependence on one or two sources of funding; this is particularly true of larger MPAs which have struggled to implement more diverse and innovative financing portfolios (Bos et al, 2015; Andrews et al, 2020a). In addition, most funding streams that do exist for marine conservation rarely match the longer timeframes needed to achieve conservation goals and are instead more influenced by political and donor cycles (Emerton et al, 2006; Bos et al, 2015; Binet et al, 2015a). Without adequate financing, MPAs cannot employ the resources needed, implement and monitor activities, or engage effectively with stakeholders, existing more on paper than in practice (Emerton et al, 2006; Leenhardt et al, 2013; Bonham et al, 2014).

O/HMPAs are even more constrained by funding than their coastal counterparts (Andrews et al, 2020b). While O/HMPAs can provide significant conservation gains, ecosystem service flows from O/HMPAs are likely to be indirect and more difficult to quantify, thereby making revenue capture more challenging.

1.5 Methods and Structure of the Paper

This white paper builds on desktop analysis, semi-structured stakeholder interviews, and expert workshops. Stakeholder and expert engagement were undertaken under the Chatham House Rule (Chatham House, 2002), therefore all views expressed from these engagements are not referenced to any one individual; instead, all findings are referenced as “Stakeholder Interviews (this study, 2020)” (see Section 7 - References). All findings in this paper are from these engagements, unless otherwise stated. Stakeholders and experts will be given the option to have their name listed in the Acknowledgement Section, if desired.

The paper begins by discussing principles and indicators for MPA finance, including identification of five characteristics that make O/HMPA finance unique (Section 2). Next, the paper examines cost categories, drivers and efficiency considerations (Section 3). Section 4 considers the finance strategies available to O/HMPAs. Three hypothetical case studies are introduced in Section 5 to test the tools and recommendations of Sections 2-4. The paper ends with a conclusion on the main findings, the gaps identified, and suggestions for future research.

2. Principles and Indicators of O/HMPA Finance

What is financial sustainability? In the past, the term “financial sustainability” was often used to describe the goal of having sufficient financial resources to cover all costs. As efforts to identify “sustainable finance” mechanisms flourished, yet vanishingly few examples of protected areas with adequate finance could be identified, this goal became increasingly elusive. In recent years, the field of conservation finance is emphasizing strategic and ongoing financial planning rather than a static (and perhaps unattainable) goal of financial sustainability, and taking a more holistic approach encompassing four different elements (Walsh, 2017; Walsh et al, 2020; Meyers et al, 2020; Sumaila et al 2020):

1. Aligning economic incentives and drivers,
2. Generating diverse financial flows,
3. Investing revenue strategically and effectively, and
4. Accounting for natural capital and the economic benefits of conservation investments.

The principles for MPA finance are not unique for O/HMPAs and therefore a succinct summary from the literature is provided first (2.1), followed by proposed indicators to aid in evaluation of MPA financial planning (2.2). The characteristics of O/HMPA that are most likely to affect financial planning are discussed in Section 2.3.

2.1 MPA Finance Principles

Effective MPA finance can be guided by ten key principles:

1. **MPA financial planning must consider enabling conditions, adaptive management and administrative capacity.**

   The success of the MPA finance will depend on a supportive policy environment. If environmental externalities, economic incentives, and fiscal policies are aligned with MPA management objectives it will help its successful implementation. Planning and administrative systems and procedures must be in place to ensure adaptive management is possible; and that the right type and amount of funding can be made available at the right time, in the right place, and for the right purposes (Emerton et al, 2006; GIZ, 2018; Meyers et al, 2020).

   Long-term sustainability is highly dependent on investing in local technical, managerial and administrative capacity (Meyers et al, 2020). Mechanisms must also be in place to ensure financial and economic benefits from the MPA are equitably shared between stakeholders. MPA financial planning should also consider contingency funds to cover for unexpected events such as oil spills. This will ensure financial resilience and longevity of financing.

2. **MPA financial planning must engage with stakeholders early and often.**

   Engaging stakeholders in the financial planning and implementation of the MPA will facilitate compatibility of finance mechanisms with context, as well as ensure long-time support for the MPA (Meyers et al, 2020). Indeed, Lewis et al (2017) identify involving key stakeholders early on as one of the most important considerations for successful MPA design. Including both MPA supporters and detractors increases transparency and will bring integrity to the process. Finance strategies must consider an equitable distribution of costs and benefits across stakeholder groups.

3. **MPA financial planning must consider social equity, environmental justice, and benefit sharing.**

   Marine conservation has a long history of being driven by Western principles which has led to a myriad of social harms including racism, separating communities from their resources, and increased economic inequities; on the other hand, marine conservation can be more effective and benefit social equity through the integration of Traditional knowledge with Western science, protecting Indigenous rights, and championing local communities (Bennett et al, 2021). These principles apply to MPA financial planning as well. Not only do Indigenous and local communities need to be fully engaged in every step of the process (see Principle #2), but each potential mechanism - and the portfolio of mechanisms as a whole - must be assessed for its potential benefits to, and negative impacts to, social equity and environmental justice. An important consideration is that any financial benefits flowing from the MPA should be shared equitably with local and Indigenous peoples.

4. **MPA financial planning should begin with accurate cost estimation.**

   A common mistake amongst MPA practitioners is to start asking for funding or structure finance mechanisms before understanding costs and funding gaps (Bovarnick et al, 2010; Stakeholder interviews, this study, 2020). It is important to begin financial planning by assessing costs. Costs for protected area management are commonly divided into establishment costs, operational costs, and opportunity costs (Bohorquez et al, 2019; Meyers et al, 2020; see Section 3.1). For established MPAs, this will include analysis of budgets and unfunded priority actions required to fulfill management objectives. For planning of new MPAs, this will require analysis of expected cost categories and estimation of costs from analysis of similar MPAs. Data on MPA costs are not readily available, but general trends of cost drivers are emerging (see Section 3).

5. **MPA management interventions should be designed to achieve maximum cost efficiencies.**

   Cost efficiency is an important element of financial sustainability. The funding gap for MPA finance may be significantly decreased by first assessing how to lower costs and achieve

MPA management effectiveness through the most cost-effective interventions (Convention on Biological Diversity - CBD, 2007; Meyers et al, 2020). Such interventions could include an assessment of the most cost-efficient location for protecting threatened species (Venter et al, 2014) or the use of new technology (Pala, 2015; Proud et al, 2016; Richards et al, 2017; Bohorquez et al, 2019).

6. **Economic incentives must be aligned with MPA management objectives.**

Sumaila et al (2020) note that "maritime countries are generating large economic outputs from the ocean economy, but the cost of ocean management is currently not being borne by those exploiting it, including direct harvesters and consumers". There is an urgent need to discourage harmful activities in marine environments, such as pollution and overfishing, and encourage more positive behaviors - in other words, to better deal with negative externalities of our ocean action. An analogy is that current MPA finance is a small trickle of water trying to fill an ever-expanding bucket. The bucket (finance gap) is expanding faster than the trickle of water (MPA funding) because impacts to the marine environment are outpacing ocean finance. Unless systematic change is enacted, the bucket will never fill. Systematic change requires assessment of externalities and economic incentives that interact with MPA outcomes, reform of fiscal policy and environmental governance to align incentives and building enabling environments for ocean-positive investments. With regard to the selection of finance strategies for MPAs (see below), priority must be given to finance mechanisms that not only generate revenue, but also create economic incentives to decrease harmful impacts to the ocean. Integrated financial planning with industries that operate within or adjacent to MPAs (e.g., fisheries) can improve economic incentive alignment.

7. **MPAs should be funded by the beneficiaries of marine ecosystem services, with core funding coming from governments and additional revenues focusing on the polluter pays principle.**

Ecosystem services can be defined as 'flows of value to human societies as a result of the state and quantity of natural capital' (TEEB, 2010). MPAs protect and sustain marine ecosystem services for numerous beneficiaries. These include coastal communities benefiting from e.g., fisheries, coastal protection, cultural and recreational values; commercial users such as commercial fishers, tourism operators and extractive industries; as well as the global population benefiting indirectly from ecosystem services such as carbon sequestration, marine genetic biodiversity, and nutrient cycling (Forest Trends and the Katoomba Group, 2010). Depending on the MPA management objective and allowable activities, the users and beneficiaries of the MPA will differ. Analysis of who is benefiting from the MPA, and who is willing and able to pay for the benefits that they receive, can guide the identification of revenue sources (see Section 4.1).

Governments have traditionally been the main funder of marine and terrestrial protection, and government budget allocations continue to be the single-most important source of

funding available to support MPAs (Iyer et al., 2018; Andrews et al, 2020a). Securing government funding, where possible, helps improve the financial stability of MPAs.

As governments are looking to find sources of funding, it is important to consider the "polluter pays principle" which states that those responsible for the pollution should bear the costs of preventing and managing it (OECD, 1992). This principle is often used beyond just polluters to include all parties that negatively impact the environment including from direct damage, overuse, extraction, etc. Following this principle, and to prioritize finance mechanisms that also create positive economic incentives for ocean health, we recommend a hierarchical approach to determining who should pay for MPA costs (see Section 4.3).

8. MPAs should have a finance strategy that includes a diversified portfolio of sources and mechanisms, which is periodically reviewed.

Development of an MPA finance strategy, also sometimes called a business plan, is essential for effective MPA finance. While this may appear to be a simplistic principle, it is noted that very few MPAs have a finance strategy or business plan, but rather many MPAs leave financial planning to be the last priority (Walsh, 2017). The finance strategy should consider cost estimates, cost efficiencies, finance sources and mechanisms, and evaluation processes. Experts in conservation financial planning should be engaged to develop and periodically review the finance strategy.

The finance strategy should include a diverse portfolio of finance sources and mechanisms. MPAs that are reliant on one source of revenue are inherently at risk of financial instability. As the COVID-19 pandemic has shown, over-reliance on a certain type of funding, such as government finance or user fees from tourism, can be devastating for MPA finance. Financial sustainability is therefore dependent on the creation of diversified portfolios of revenue streams. It is essential to strike a balance between too few revenue streams (risk of finance drying up) and too many revenue streams (strain on management capacity) (Bos et al, 2015). Finding this balance depends on the capacity of individual sites. Only through a diversified mix of conventional funding mechanisms (such as national budgetary allocations or donor funding) and more complex funding mechanisms (such as trust funds or user fees), can will help ensure protected areas secure stable and sufficient long-term funding (CBD 2007; Meyers et al, 2020).

9. Selection of finance mechanisms should be based on site-specific feasibility analysis.

In conservation finance, there is no silver bullet. Selection of finance mechanisms depends entirely on site-specific characteristics including ecological, social, legal, cultural, and economic factors. As further discussed in Appendix 4, the choice of finance mechanism is highly site-specific and dependent on factors such as MPA management objectives, degree of remoteness and jurisdictional location.

10. **MPA financial planning should match the duration of management objectives with the duration of finance mechanisms.**

    The timeframe for financial planning should be at least 10-20 years. Donor funding is commonly limited to three years, while many projects and finance mechanisms take much longer to implement. The Seychelles blue bond, for instance, took three years to set up and covers a 10-year period. MPAs should aim for an appropriate mix of finance mechanisms with small set-up costs and short time frames, and mechanisms with longer pay-out periods but with longer establishment time.

2.2 MPA Finance Indicators

Tracking progress towards improved financial sustainability is challenging. This section provides recommended indicators for each of the MPA Finance Principles (from 2.1) in Table 1. Site- and context-specific methods for evaluating MPA financial sustainability will be required.

Table 1. Indicators for MPA Finance Principles

MPA Finance Principles		**Indicators**
1	MPA financial planning must consider enabling conditions, adaptive management and administrative capacity.	Assessment of enabling conditions undertaken (yes / no) Adaptive management plan in place (yes / no) Required administrative systems in place (yes / no)

MPA Finance Principles		**Indicators**
2	MPA financial planning must engage with stakeholders early and often.	Number of stakeholders engaged in financial planning (#) Number of times stakeholders engaged (#) Amount invested in developing local capacity (USD)

3	MPA financial planning must consider social equity, environmental justice, and benefit sharing.	Traditional, Indigenous, and local communities are adequately involved in financial planning (yes / no) Social equity and environmental justice has been considered for each finance mechanism, as well as for the portfolio of mechanisms as a whole (yes / no) Costs and benefits of the MPA are distributed equitably across stakeholder groups (yes / no)
4	MPA financial planning should begin with accurate cost estimation.	Establishment costs have been estimated (yes / no) Operation costs have been estimated (yes / no) Opportunity costs have been estimated (yes / no) Funding gap has been estimating (yes / no) Costs have been validated through stakeholder consultation (yes / no)
5	MPA management interventions should be designed to achieve maximum cost efficiencies.	Establishment costs have been estimated (yes / no) Operation costs have been estimated (yes / no) Opportunity costs have been estimated (yes / no) Funding gap has been estimating (yes / no) Costs have been validated through stakeholder consultation (yes / no)

MPA Finance Principles	**Indicators**

6	Economic incentives must be aligned with MPA management objectives.	Assessment of economic incentive alignment has been conducted (yes / no) Changes to economic incentives implemented (#)
7	MPAs should be funded by the beneficiaries of marine ecosystem services, with core funding coming from governments and additional revenues focusing on the polluter pays principle.	Core costs covered by government(s; %) Core costs covered by commercial users (%)
8	MPAs should have a finance strategy that includes a diversified portfolio of sources and mechanisms, which is periodically reviewed.	Finance strategy (standalone or as part of a business plan) is published (yes / no) Finance strategy is updated at least every five years (yes/no) Number of finance sources (#) Number of finance mechanisms (#) Core funding from a single revenue source (%)
9	Selection of finance mechanisms should be based on site-specific feasibility analysis.	Site-specific feasibility analysis of finance mechanisms conducted (yes / no; see Appendix 4 for suggested criteria)
10	MPA financial planning should match the duration of management objectives with the duration of finance mechanisms.	Average duration of revenue stream(s; # years)

2.3 Characteristics of O/HMPAs that Affect Financial Planning

O/HMPAs are more constrained by funding than their coastal counterparts (Andrews et al, 2020b). This section explores five key characteristics of O/HMPAs that impact financial planning:

1) governance,
2) remoteness,
3) size,
4) activities, and
5) biological productivity level of the pelagic environment.

These characteristics are described next and also used in Section 3 to determine cost drivers, and in Section 5 to describe case study characteristics. Each characteristic is further classified into three categories based upon those attributes that show significant implications for management and potential cost/finance options. These characteristics and categories are summarized in Table 2 below. These characteristics interact and create synergies and feedback loops, but for the purpose of this analysis, each characteristic is treated separately below.

Another characteristic that influences financial planning is the presence of and type of beneficiaries, and this is covered in Sections 3 and 4.

N.B. The table is not meant to be read vertically, but rather, it provides the options for selection of the most appropriate category for each characteristic.

Table 2: Characteristics of O/HMPAs

Characteristic	**Categories**		
Governance	Within EEZ	Both within EEZ and High Seas	High Seas only
Remoteness	Bordering the coastal zone	Far from coast, but with station/landing dock	Far from coast with no station/landing dock
Size	Small: < 10,000 sq km	Medium: 10,000 – 100,000 sq km	Large: > 100,000 sq km
Activities	No-take	1-2 activities	Multi-use
Biological Productivity	Low	Medium	High

1. Governance

Jurisdictional location will define MPA governance structures and is therefore one of the most significant determinants of viable financing options. This should be the starting point for developing any O/HMPA finance strategy. Three simplified categories for O/HMPA governance are within an EEZ, both within EEZ and High Seas, and High Seas only.

If the MPA is within the EEZ of a country the government has the legal powers - and responsibility - to control its borders, and the use of public finances can be justified (even if it is not always used; United Nations Convention on the Law of the Sea; UNCLOS, 1982). Indeed, the majority of biodiversity conservation finance comes from governments today (Iyer et al, 2018). If, on the other hand, the MPA is situated outside of the EEZ, no overarching legal body currently exists to help enforce it and there is no current obligation on governments or the global community to finance it. The 1982 UN Convention on the Law of the Sea (UNCLOS) provides the main framework for regulation and management of activities in the global oceans, and under article 117 all countries have a duty to conserve high seas living resources (O'Leary et al, 2012; Day et al, 2015). However, without an overarching legal body, enforcing the rules is challenging. As an example, Kaplan et al (2009) describe the moratorium on fishing in the Gulf of Guinea in the 1990s, proposed by European fishing industries as a way to reduce juvenile catch. The moratorium was

upheld by most regional fisheries, but not by South Korean fishers working under the flag of Ghana, despite several observer programs. This disincentivized other fishers to uphold the protection plan and resulted in a near abandonment of the plan in 2005.

Current ABNJ work to develop a management framework is on-going. Once finalized, a complementary financing framework, which has been designed alongside current negotiations, should be put in place. This will have significant implications for HMPA financing options.

Some MPAs are transboundary, including both EEZ and ABNJ areas, which adds another level of coordination and complexity. That said, financing options will remain similar and represent a combination of those available under the enclosed jurisdictions.

To take this even deeper, the specific laws and regulations for each MPA must be considered. Each finance mechanism will have a specific set of governance requirements, which must be considered against the existing and potential future governance arrangements of the MPA.

2. Remoteness

The relative remoteness of O/HMPAs has a number of implications for both its costs and available financing mechanisms. While O/HMPAs can provide significant conservation gains, ecosystem service flows from O/HMPAs are likely to be indirect and more difficult to quantify, thereby making revenue capture more challenging. Three simplified categories for O/HMPA remoteness are bordering the coastal zone, far from the coast but with a station or landing dock, and far from the coast without any landings.

Remote O/HMPAs will likely have higher costs associated with research and transportation needs due to increased fuel costs and required time spent at sea. The presence of islands within the O/HMPA can reduce these costs to some degree by providing on-land facilities which can reduce boat use, which tends to have a high unit cost. It is likely that relative surveillance and enforcement costs will also be higher than in more nearshore areas; however, this pattern may not be linear as fewer stakeholders overall may result in lower absolute monitoring & enforcement costs. In addition, technological developments are helping to address some of the challenges associated with remote surveillance (see Section 3.1).

The number of stakeholders in an MPA and its level of remoteness are tightly linked; remote O/HMPAs generally have fewer stakeholders, which can have serious implications for viable financing strategies. While coastal MPAs have the possibility to tap local stakeholders such as tourists or local communities for finance through e.g., user fees or Payment for Ecosystem Services (PES), this option is more limited in remote MPAs. The presence of islands and respective island communities within OMPAs may negate this issue to some extent.

3. Size

The size of the O/HMPA will have consequences for cost structures, and thus finance strategies. Three simplified categories for O/HMPA size are small (<10,000 sq km), medium (10,000 sq km to 100,000 sq km), and large (>100,000 sq km). Although there is no requirement for O/HMPAs to be large in size, the reality is that many of them are (36/47; 77% are over 100,000 km2 in size; see Appendix 2). Lewis et al (2017) point out that larger MPAs can have larger costs than their smaller counterparts in relation to stakeholder engagement (if it has a large number of stakeholders); monitoring & enforcement as surveillance and other technological capabilities at a large scale are very costly; finding staff with relevant experience; data collection and analysis; and general management.

Two studies are of particular note here – Balmford et al (2004) which studied the relationship between running costs and MPA size; and McCrea- Strub et al (2011) which studied establishment costs in relation to MPA size. McCrea-Strub et al (2011) note that MPA total establishment costs tend to increase with size of MPA; however that costs per unit decrease likely due to economies of scale. Balmford et al (2004) also find decreasing per unit costs for management costs, resulting in higher per unit costs for smaller MPAs.

4. Activities

The final Marine Spatial Planning (MSP) will influence costs and finance options for any O/HMPA. Three simplified categories for O/HMPA activities are no-take, 1-2 activities, and multi-use.

More complex MSPs are likely to incur greater establishment costs but at the same time enable a larger set of financing options. A multi-use MPA with a zonation structure that allows more activities will also require complex monitoring & enforcement requirements, as well as more management. For example, Ban et al (2011) have pointed out that 100% no-take MPAs are generally cheaper in terms of management costs than multi-purpose MPAs of the same size with 30% no-take. The activities allowed also affect the number of stakeholders that will need to be engaged with. While this can mean higher costs per unit costs, it will also increase the potential to structure different finance solutions. If tourism is allowed, for instance, structures tapping tourists for finance could be set up. However, the costs of adding additional stakeholders should be balanced with their potential to access appropriate finance.

5. Biological productivity

The dynamic nature of pelagic habitats has major implications for MPA designation and management. Three simplified categories for O/HMPA biological productivity are low, medium, and high.

Depending on management objectives of the MPA and the associated nature of the pelagic habitat, the MPA will incur different costs and different finance strategies may be applicable (e.g., will it protect migratory species, spawning or nursery grounds, critical habitats or particular species, or the whole water column as well as benthos?). In addition, pelagic habitats, being some

of the least explored ecosystems on earth, are generally more data poor than terrestrial and coastal ecosystems, which will only serve to increase MPA management costs.

The pelagic zone, and any remote islands within it, provide an important habitat for many migratory species such as whales, seabirds, sea turtles, sharks, and many commercially important species, such as tuna. Migratory species can cover huge distances in their search for prey and breeding grounds (Marine Conservation Institute, 2020; High Seas Alliance, 2020). Depending on the final management objective, different financing options will be available - for example, the protection of charismatic species may unlock finance through the promotion of intrinsic values (although to date such channels remain small).

The dynamism of pelagic habitats will also require adaptive management, which may increase costs and further influence finance strategies. For example, O/HMPA delineations may need to be amended in order that they continue to protect the right areas and resources, particularly in light of any upcoming temporal shifts due to climate change. These changing conditions may open up new financing opportunities or curtail existing ones.

Productivity levels is another consideration that will have significant implications for MPA, and designation, implementation, and opportunity costs. Ninety percent of global marine catches today occur in the coastal boundary zone, the deep seas being less productive and exploited mostly for their large pelagic fish (Pauly & Alder, 2005). This will impact finance strategies and costs as less productive areas means e.g., less data collection needs - but also fewer stakeholders to tap for finance. If very unproductive it might call into question the MPA designation in the first place.

In addition, the dynamic pelagic environments means that MPAs provide vital spillover effects to more nearshore areas (Cabral et al, 2020; Curnick et al, 2020). Pelagic environments provide a vital lifecycle stage to some species which are harvested in coastal regions or become the basis of coastal marine tourism activities. Finance mechanisms could be designed to protect pelagic habitats through the engagement of linked coastal beneficiaries. For example, protecting areas important in the life cycle of charismatic species such as sharks or turtles can be supported by revenues generated from their tourism conducted elsewhere.

3. Costs

This section first outlines the key factors that may drive costs in MPAs, before developing a framework for estimating their magnitude based on O/HMPA characteristics (from Section 2.3).

Given the lack of available cost data for O/HMPAs, further guidance is provided for future documentation of O/HMPA costs and developing subsequent cost models. This information can be found in Appendix 3.

3.1 Overview of MPA Costs

Costs for protected area management are commonly divided into establishment costs, operational costs, and opportunity costs (Bohorquez et al, 2019; Meyers et al, 2020):[3]

- **Establishment costs** are accrued 'in the time period from project conception up to the start of implementation. Bohoroquez et al (2019) lists these costs to include acquisition costs, administration costs, legal fees, transaction costs, research and surveys, and initial capital costs for enforcement equipment, tourism, or other capital infrastructure', although this list is not exhaustive and should include all relevant costs accrued prior to implementation. .
- **Operational costs** relate to the daily management and implementation of the MPA. Such costs include annual costs of management such as staff salaries, maintenance, scientific research, monitoring & enforcement, as well as costs associated with tracking protected area performance and any public or stakeholder outreach (Bohorquez et al, 2019).
- **Opportunity costs** relate to the economic benefits foregone as a result of MPA establishment. They are often borne by external stakeholders rather than the MPA management directly, and can include fishing profits that are forgone when an area is closed. These costs may be incorporated into MPA costs if compensation to external stakeholders is required, e.g., costs associated with fishing buy-back schemes (Cameron et al. 2008; Ban et al, 2011). Although opportunity costs associated with protected area establishment should be acknowledged, they should be considered alongside current subsidies promoting activity within these areas, environmental benefits and spillover effects.

The financial planning literature has a number of recommendations and examples for determining cost categories (e.g., Conservation and Community Investment Forum (CCIF), 2008; Starling Resources, 2012; Binet et al, 2015b; Global Conservation Fund (GCF), 2019). Common cost categories include:

Budget cost categories	**Programmatic cost categories**
Personnel	Management
Travel	Surveillance and Enforcement
Infrastructure	Education and Outreach
Maintenance	Science and Research

[3] This paper will focus primarily on the first two: establishment and operational costs. Analysis of opportunity costs is beyond the scope of the paper.

Costs associated with the implementation and management of MPAs are highly variable, site-specific and dependent on a range of factors. Ban et al (2011) suggest two 'rules of thumb' which influence MPA costs in general:

1. Management costs associated with a large MPA comprising multi-use zones are *less cost efficient* than a large no-take MPA of the same size. The authors go on to note that 'management of a multiple-use area with 30% protection was between 1.3 to 2 times more expensive than the same area with 100% protection'; and
2. Per unit area, management costs are not linear but instead initially decrease as MPA size increases but this relationship cannot be extrapolated to very large MPAs; instead, after a certain threshold per unit management costs once again increase, resulting in a polynomial relationship.

Balmford et al (2004) identified three cost drivers that are extremely relevant to O/HMPAs: size, distance from inhabited land, and Purchasing Power Parity. Within the analysis, these three variables predicted almost all of the variation seen within MPA total running costs. MPA size is considered the most significant predictor, with smaller MPAs seen to cost more per unit area to run. Overall, Balmford et al (2004) concluded that MPAs were more costly per unit area where they are small, where they are close to inhabited land, and where cost structures are high. Results indicate higher costs per unit square as well as increased management costs associated with a larger number of coastal stakeholders vs. offshore. However, as previously noted, Ban et al (2011) further state that the MPA size has a nonlinear relationship to cost, increasing again after a certain size. Leenhardt et al (2013), Wilhelm et al (2014) and Lewis et al (2017) note that compared to smaller MPAs, LSMPAs face additional costs associated with e.g., consistent, ongoing research and monitoring; consultations across numerous stakeholder groups; and large-scale surveillance and enforcement requirements (Andrews et al, 2020b).

3.2 O/HMPA Cost Categories, Drivers and Efficiencies

O/HMPA costs are highly variable and ultimately determined by site- specific characteristics and management objectives. Through this study, one of the objectives was to define rules of thumb for O/HMPA costs; a significant finding is that rules of thumb are not possible. In some cases O/HMPA costs are higher than coastal MPAs due to increased surveillance needs and fuel / transportation costs, yet in other cases the areas are so remote that management needs - and therefore costs - are relatively small. Extensive stakeholder consultation revealed that there is not consensus on either magnitudes of costs nor relative magnitudes of cost categories.

Although aggregate predictions cannot be made for O/HMPA costs, some patterns are emerging.Significant cost categories for O/HMPAs have been identified as:

- Personnel
- Transport
- Stakeholder engagement
- Monitoring & enforcement
- Data collection and scientific research

It should be noted that these categories represent both budget categories and programmatic/functional components (Starling Resources, 2012). We include both herein as these are seen as significant individual costs to O/HMPAs, however it is worth acknowledging that some budget costs may be consolidated within programmatic activities and can represent some degree of double counting. That said, this table and categorization represents a guide for further discussion and is not meant as a mechanism by which to aggregate costs, merely to indicate possible areas where costs could be significant and/or made more efficient.

Significant cost drivers include management objectives, degree of remoteness, and complexity of MPA design. Analysis of cost drivers for each cost category is presented in Table 3. Also presented in this table is a qualitative analysis of considerations for increasing cost efficiencies for each cost category.

Table 3: O/HMPAs Cost Categories, Drivers, and Efficiencies

#	Cost Categories	Description	Cost drivers	Cost efficiencies
1	**Personnel**	Personnel costs are considered to be the most significant O/HMPA cost. For some O/HMPAs these costs can represent some 70% of all budget requirements. Actual costs highly dependent on nature and management objective(s) of O/HMPA.	As a rule, personnel costs as % of total costs are still likely lower than in smaller MPAs due to higher monitoring & enforcement/data research needs (based on the majority of O/HMPAs being large). Multi-use O/HMPAs with numerous stakeholder groups are likely to have high personnel needs in both outreach and monitoring & enforcement sectors. In some cases where O/HMPA are remotely monitored and managed, personnel costs could theoretically be very low – management could take on a simple coordination role.	Cost efficiencies in personnel costs can be achieved by sharing the cost burden with other, often government, agencies. For example, enforcement of any O/HMPA can fall under the responsibility of the Ministry of Fisheries/Tourism for respective sectors. In addition, costs for data collection could be shared with research bodies such as universities. One interview respondent noted that ideally MPA staffing should be limited to a coordination role(s) between the necessary agencies only.

#	Cost Categories	Description	Cost drivers	Cost efficiencies
2	**Transport**	Vehicle procurement, fuel and maintenance are significant expenses for many O/HMPAs and make up a high % of total management costs. Transportation costs for supplies and personnel in O/HMPAs can be significant, due to O/HMPA remoteness and often large size. While this cost will underpin many of the programmatic functions it is also a significant cost for all activities including any general personnel travel or material transports.	It is assumed that those more remote O/HMPAs will have higher overall transport costs. Larger O/HMPAs will also require travel over larger distances. The presence of islands may reduce transportation costs as infrastructure and potential for flights can reduce costs associated with shipping/ liveaboard access only. If there are no islands in the O/HMPA, costs will increase further as there will be nowhere to refuel and resupply vessels. The greater the monitoring & enforcement requirements the more transport required.	Collaborating with existing bodies, or using existing structures, can help drive down costs significantly. In the Cocos Island MPA in Costa Rica, for instance, transportation costs have been reduced by using dive operators visiting remote islands to carry supplies.

#	Cost Categories	Description	Cost drivers	Cost efficiencies
3	**Stakeholder engagement**	Monetary and non-monetary benefits must be balanced with the need for protection, and MPA benefits communicated to all stakeholders to get their support for MPA designation and ongoing implementation. The level of engagement needed, and the number of stakeholders will depend on the nature of the MPA, and thus costs can vary widely. The type of stakeholder will also impact costs, e.g., if commercial fishers are involved, stakeholder engagement costs are likely to be high as stakeholder can include well-funded lobbying groups and support may not be forthcoming from the onset.	More stakeholders mean higher costs and can also mean more potential for conflict. In remote areas, costs related to stakeholder engagement and benefit-sharing may be reduced; although island communities might mean significant engagement is needed. More complex MSPs will require higher stakeholder engagement. In addition, those O/HMPAs located closer to shore are likely to have larger stakeholder interest.. O/HMPAs with higher productivity will have higher stakeholder engagement costs as more work will be required to acclimatize stakeholders (e.g., commercial fishers) with new protection status).	There are limited options for increasing the cost efficiencies of stakeholder engagement. In some cases, virtual engagements may replace some in-person engagement and therefore reduce travel costs; however, in most cases, extensive in-person consultations are required. Designing effective engagements may reduce the number of engagements that need to occur; for example, hiring a professional facilitator may actually save money in the long run. Including key stakeholders from the onset will reduce potential hurdles - and any associated costs in addressing them.

#	Cost Categories	Description	Cost drivers	Cost efficiencies
4	**Monitoring & enforcement**	Monitoring & enforcement is often considered to be more costly in O/HMPA's than coastal MPAs due to their remote nature and often larger size. However, recent technological advances have the potential to significantly reduce costs, as monitoring & enforcement move away from in-person patrols to more remote technologies. Nonetheless, some monitoring & enforcement may continue to require in-person presence, such as tourism management. Final costs will ultimately depend on monitoring & enforcement strategies and level of productivity/ threat.	Generally, more remote O/HMPAs are associated with higher monitoring & enforcement costs due to increased transportation costs. Multi-use O/HMPAs with numerous stakeholder groups are likely to have higher monitoring & enforcement requirements/costs. Highly productive areas (such as productive fishing grounds) will likely require more monitoring & enforcement, associated with higher costs. Remote, limited use O/HMPAs with low productivity may require little to no monitoring & enforcement. Indeed monitoring & enforcement could prove to be a waste of money as risks to the area remain low.	Surveillance technology has made a lot of advances in the past few years. Current examples include radar and satellite technology, such as Global Fishing Watch and Vessel Monitoring Systems (VMS), which help track down vessels fishing illegally, thus reducing costs associated with active vessel patrols (Bohorquez et al, 2019; Stakeholder interviews, this study, 2020). However, technology can at present only go so far in reducing these costs; under international law, requirements around 'hot pursuit' may limit a country's ability to catch illegal fishers once they travel into another country's EEZ. This means that countries must also still invest in sufficient vessel infrastructure to deter illegal fishing operations. In addition, even with successful use of remote surveillance technologies, boats and personnel are still required to apprehend poachers. Also, costs can be reduced through closer collaboration with related agencies; surveillance and enforcement of MPA borders might be more appropriately done by, and paid for, national security agencies rather than MPA staff. This is currently being done in Latin America and the Caribbean, where the Navy/Ministry of Defense help with patrolling. Similarly, reinvestment of fines collected from O/HMPA areas should be reinvested into its management.

#	Cost Categories	Description	Cost drivers	Cost efficiencies
5	**Data collection & scientific research**	Satisfying data needs may be more costly in more remote deep-water areas which are often data poor and hard to access. Data is needed for MSP scientific exploration and monitoring of habitat and species conditions. The deep-sea nature of O/HMPA requires specialized equipment and personnel.	As with previous cost categories, the remote nature and often larger size of O/HMPA leads to higher costs due to higher transportation costs. MSP can represent significant establishment cost for O/HMPAs; more complex MSP show higher costs associated with a greater need for more data collection and research across more planning units/ecosystem types during the design and management phases. Areas of high biodiversity may be associated with higher levels of scientific research. Low levels of productivity (often associated with remote open ocean areas) may have fewer data requirements for planning processes, which should drive down costs.	Technological advances have the potential to reduce costs related to scientific monitoring and exploration (Pala, 2015; Proud et al, 2016; Richards et al, 2017). Bohorquez et al (2019) conclude that for monitoring ecological performance 'remote sensing currently remains limited to surface layers of the ocean, and expensive (and sometimes environmentally harmful) in situ monitoring tasks such as SCUBA diving and benthic trawls are often needed (Pomeroy et al, 2005). However, further improvements in remote monitoring and advancements in other cheaper and less invasive in situ methods such as environmental DNA, drones, and satellite images may lead to significant cuts in operational costs required for MPAs in the future (Bohmann et al, 2014).' Data collection costs can also be reduced through closer collaboration with the scientific community, the government, and potentially across governments as well as country borders.In Latin America, agencies work with Governments to promote public access to VMS data; so far Peru, Costa Rica, Chile and Panama have agreed. Similarly, Indonesia has made all of its VMS data public.

Table 4 below combines the O/HMPA characteristics from Section 2.3 (governance, remoteness, size, activities, biological productivity) with the cost categories from Table 3 (personnel, transport, stakeholder engagement, monitoring & enforcement, and data & research) to provide qualitative guidance on O/HMPA costs. Green shading represents lower costs, while red shading represents higher costs. The color gradients indicate cost directions and are relevant within each box; these colors are not comparable across boxes as information as to the magnitude of these costs across categories and characteristics is not available and likely to be very site specific. This table enables better understanding of how individual characteristics of an MPA interact with a cost category, e.g., a small O/HMPA (<10,000 sq km) may have relatively high personnel costs (red) but relatively low monitoring and evaluation costs (green). This table will form the template for analyzing costs for selected case studies in Section 5.

Table 4. Relationship between O/HMPA characteristics and magnitude of costs

		Cost Categories				
O/HMPA Characteristics		**Personnel**	**Transport**	**Stakeholder engagement**	**Monitoring & enforcement**	**Data collection & scientific research**
Governance	Within EEZ	High levels of coordination and support from government can reduce O/HMPA costs across all budget items/cost categories, i.e. delivery of ministry mandates/cost-sharing by government navy/ministry of fisheries can reduce O/MPA specific M&E costs. Coordination across national goverments may increase intial planning costs but could reduce national costs overall.				
	Both within EEZ and High Seas					
	High Seas only					
Remoteness	Fairly close to coast	Personnel costs likely to be lower in those more remote areas with little connectivity as fewer activities possible	Transport costs likely to increase with distance from coast; however O/HMPAs with available islands for transportation hubs/local stations may reduce costs	Stakeholder engagement & outreach likely to be less expensive as remoteness increases due to fewer stakeholders. Notable exception include increased costs associated with outreach to remote island populations and those remote areas with strong connections to distant indigenous communities living elsewhere	Higher M&E costs associated with more remote areas due to fuel costs, however costs may be offset as many remote areas have fewer activities and lower productivity; costs can also be reduced with more remote surveillance, however any necessary interception costs will likely remain high	Higher data & research costs associated with more remote areas due to logistical and fuel costs; islands can add to research needs as these are often associated with higher biodiversity
	Far from coast but with station/landing doc					
	Far from coast but with no station/ landing doc					
Size	Small	Personnel costs per unit of area likely to be lower as size increases due to economy of scales	Transport costs likely to increase as O/HMPA size increases; again costs can be reduced if island infrastructure can reduce ship at sea time	Although costs are likely larger in O/HMPAs, stakeholders size and needs more likely correlated to MSP complexity and productivity	M&E costs likely to increase as size increase but at non-linear rate due to economies of scale and cost efficiencies associated with remote monitoring	Data & Research needs likely to increase with size of MPA
	Medium					
	Large					
Activities	No-take	Personnel costs likely to increase alongside more complex MSP/allowable activities due to increased management and monitoring needs		Stakeholder engagement & outreach likely to increase as activities increase/MSP becomes more complex	M&E costs likely to increase as permissible activities increase/ MSP complexity increases	Higher data & research costs associated with more complex MSP process
	1-2 activities					
	Multi-use					
Biological Productivity	Low	Higher personnel needs/costs associated with more productive areas due to increased M&E/ Research needs		Higher stakeholder engagement and outreach costs associated with areas of higher productivity as stakeholders may require more consultation and compromise	Higher M&E costs associated with areas of higher productivity	Higher data & research costs associated with areas of higher productivity/ complexity of the environment
	Medium					
	High					

4. Finance Solutions

For an overview of finance for marine conservation and marine protected areas in general, the reader is directed to several recent sources (Sumaila et al, 2020; Friends of Ocean Action & Ocean Fox Advisory, 2020; Andrews et al, 2020).

To fill the O/HMPA funding gaps, strategic and concerted effort is required to understand potential funding sources (4.1) and potential funding mechanisms (4.2). Identification of the most feasible finance solutions is very site-specific and requires expert analysis. The process may begin with a high-level screening to identify a short-list of potential finance mechanisms (4.3), followed by a site-specific feasibility analysis using ecological, social, economic, and legal considerations (see Appendix 4).

4.1 Users, Beneficiaries, and Revenue Sources

As described above in the MPA Finance Principle #7 (Section 2.1), MPAs should be funded by the beneficiaries of marine ecosystem services, with core funding coming from governments and additional revenues focusing on the polluter pays principle.[4] In order to systematically identify potential revenue sources for O/HMPAs, this section identifies the users and beneficiaries[5] of O/HMPA ecosystem services. This becomes the basis for identification of potential revenue sources and mechanisms.

Ecosystem services can be defined as 'flows of value to human societies as a result of the state and quantity of natural capital' (TEEB, 2010). The Millennium Ecosystem Assessment (2005) outlines four categories of ecosystem services:

- **Provisioning services**: wild foods, crops, fresh water, raw materials and plant-derived medicines.
- **Regulating services**: filtration of pollutants by wetlands, air quality regulation, climate regulation through carbon storage and water cycling, biological control, prevention of soil erosion, pollination, and protection from disasters.
- **Cultural services**: recreation and mental and physical health, tourism, aesthetic values such as language and knowledge of the natural environment, and spiritual values; and
- **Habitat or Supporting services:** provision of habitats for different species, maintenance of genetic diversity.

Beneficiaries for each of the four types of ecosystem services are outlined next, grouped by commercial users and beneficiaries (4.1.1), non-commercial users (4.1.2), and non-commercial

[4] This principle is often used beyond just polluters to include all parties that negatively impact the environment including from direct damage, overuse, extraction, etc.

[5] All users are also beneficiaries, however, in keeping with common terminology, this paper will use the term "users" to mean direct users, whereas "beneficiaries" will indicate indirect use.

beneficiaries (4.1.3). The reason for presenting the users and beneficiaries in this order is to aid in the identification of finance mechanisms in Section 4.3. A brief discussion on the willingness and ability of users and beneficiaries follows in Section 4.1.4.

4.1.1 Commercial Users and Beneficiaries

Table 5. O/HMPA Ecosystem Services and Commercial Users and Beneficiaries

Type	Ecosystem Service	Commercial Users and Beneficiaries
Provisioning Services	Wild Capture Fisheries.	Everyone in the seafood value chain including fishers, processors, wholesalers, retailers, consumers, investors, and also producers of goods and services in the commercial fishing industry.
Provisioning Services	Offshore Aquaculture/Mariculture. Employment; source of protein.	Everyone in the seafood value chain including fishers, processors, wholesalers, retailers, consumers, investors, and also producers of goods and services in the aquaculture industry.
Provisioning Services	Deep Sea Minerals. Seabed mining is becoming increasingly developed as global demand for minerals continues to increase.	Everyone in the value chain from mining operators, processors, wholesalers, retailers, primary and secondary consumers, investors, and also producers of goods and services in related products that use the deep-sea minerals (technology, communications, manufacturing).
Provisioning Services	Offshore Oil & Gas. Oil and gas are big parts of many coastal state economies today.	Everyone in the value chain from mining operators, processors, wholesalers, retailers, consumers, investors, and also producers of goods and services in related products that use the oil and gas (plastics, fuel, etc.).
Provisioning Services	Offshore Marine Renewables. Wind, tidal and wave energy. Offshore wind energy is becoming more common as a source of energy. Tidal and wave energy, and ocean thermal conversion, have potential but are yet to be developed at commercial scale (The World Bank & UN DESA, 2017).	Everyone in the value chain from operators, distributors, retailers, consumers, and investors.
Provisioning Services	Marine Bioceuticals. Novel genes and biological compounds can be used to develop pharmaceuticals, enzymes, cosmetics, and other products (The World Bank & UN DESA, 2017).	Everyone in the value chain from researchers, collectors, processors, wholesalers, retailers, consumers, and investors.
Provisioning Services	Shipping. The industry benefits from being able to transport goods across the world's oceans.	Vessel construction, vessel destruction, vessel owners, vessel operators, brokers, clients, and insurers.
Cultural Services	Tourism & Recreation. Some activities such as diving, sailing and whale watching can take place further out at sea.	Tour operators, consumers, and investors. Developers, cruise lines, local communities for recreation.

It is worth noting that financial institutions may include:

- Impact investors. Impact investors seek a financial return on investment in addition to social or environmental returns. They typically have a relatively long (5-7 year) investment horizon compared to mainstream investors. Mirova is one example.
- Venture capitalists. Venture capitalists make high-risk/high return investments into star-up companies. Venture capital could play a role in nurturing new start-ups and in ocean technology investments, for instance. CI Ventures is one example (Friends of Ocean Action (FOA), 2020).
- Equity investors. Invests primarily through equity. Private equity seeks to "provide growth capital or support buyouts of unlisted entities with a view to securing strong returns on behalf of their investors over a predetermined lifetime" (Deloitte, 2021). Blue Oceans Partners, for instance, works to invest in sustainable fisheries, aquaculture, renewable energy, and plastic pollution mitigation.
- Commercial banks. Can provide "blue lending" to marine related projects, or help structure finance mechanisms, like the Seychelles Blue Bond (FOA, 2020). Examples include the International Finance Corporation, Credit Suisse and Standard Chartered.

4.1.2 Non-Commercial Users

Table 6. O/HMPA Ecosystem Services and Non-Commercial Users

Type	Ecosystem Service	Non-Commercial Users
Provisioning Services	Wild Capture Fisheries. Key source of protein.	Recreational and subsistence fishers (OMPA only)
Provisioning Services	Transit for military or security purposes.	Governments.
Regulating Services	Nutrient Cycling. The ocean cycles nutrients from the surface to the deep, and from the poles to the equator.	National population (OMPA only).
Cultural Services	Recreation.	Local population (OMPA only).
Cultural Services	Spiritual Values.	Culturally connected populations, global population.
Cultural Services	Aesthetic Values.	Local populations, regional populations, global populations.
Supporting Services	Habitat for Diverse Marine Life. Pelagic ecosystems directly and indirectly support almost all marine life and hosts some of the least-impacted and least-discovered habitats on earth.	Local populations, national populations (OMPA only).
Supporting Services	Habitat for Migratory Species. Pelagic ecosystems directly and indirectly support almost all marine life and hosts some of the least-impacted and least-discovered habitats on earth.	Local populations, national populations (OMPA only).

Supporting Services	Marine Genetic Diversity. The high seas play a key role in maintaining marine genetic diversity and the abundance of keystone species.	Local populations, national populations (OMPA only).

4.1.3 Non-Commercial Beneficiaries

Table 7: O/HMPA Ecosystem Services and Non-Commercial Beneficiaries

Type	Ecosystem Service	Non-Commercial Beneficiaries
Regulating Services	Carbon Sequestration. The ocean provides important carbon storage through 1) physical processes, where carbon dioxide dissolves in the water and is transported to areas where seawater sinks to the seabed and is stored for hundreds to thousands of years; and 2) biological processes, where photosynthesis by phytoplankton fixate surface carbon; some of which is then transported through the food web to the seafloor. As such they are important tools for ecosystem-based climate change mitigation (Rogers et al, 2014).	Regional and global populations.
Regulating Services	Oxygen Production. Approximately 50-80% of oxygen production on earth comes from the ocean (NOAA, 2021).	Regional and global populations.
Regulating Services	Water Cycling. As 78% of global precipitation occurs over the ocean, the ocean affects rainfall, the movement of heat in the climate system, and the eventual return of freshwater into the sea (NASA, 2021).	Regional and global populations.
Regulating Services	Nutrient Cycling. The ocean cycles nutrients from the surface to the deep, and from the poles to the equator.	Regional and global populations.
Cultural Services	Spiritual Values.	Culturally connected populations, global population.
Cultural Services	Aesthetic Values.	Regional and global populations.
Supporting Services	Habitat for Diverse Marine Life. Pelagic ecosystems directly and indirectly support almost all marine life and hosts some of the least-impacted and least-discovered habitats on earth (Halpern et al, 2008).	Regional and global populations.
Supporting Services	Habitat for Migratory Species. Pelagic ecosystems directly and indirectly support almost all marine life and hosts some of the least-impacted and least-discovered habitats on earth.	Regional and global populations.
Supporting Services	Marine Genetic Diversity. The high seas play a key role in maintaining marine genetic diversity and the abundance of keystone species.	Regional and global populations.

4.1.4 Willingness and ability to pay

When considering how to monetize ecosystem services, it is useful to consider which beneficiaries are 1) willing and 2) able to pay for the benefits that they receive. The willingness of a stakeholder to pay measures how much on average a constituency is willing to contribute for a specified benefit or set of benefits. Ability to pay refers to the constituent's financial circumstances and disposable income. WTP surveys are commonly used in developing pricing strategies in business and have been widely used in protected area finance to price user fees and other compensation mechanisms including in MPAs (e.g., Gelcich et al, 2013).

WTP is not static. When stakeholders are empowered to lead and/or co-manage their resources, they are more likely to be involved in the design of finance mechanisms and financial strategies, including being more aware of the costs associated with MPA designation and implementation. In the Antarctic and the Arctic, for instance, campaigns targeting issues such as melting icebergs and decreasing polar bear habitats have helped increase public awareness and willingness to help.

The analysis of which beneficiaries are both willing and able to pay is very site- and context-specific. In some instances, traditional ownership relationships can override any WTP for use values, instead redirecting the conversation to willingness to accept (or compensation) values. Given the lack of homogeneity and the lack of data, assessing the ability and willingness to pay of Offshore and High Seas beneficiaries is challenging and will require further analysis.

Additionally, the type of ecosystem service affects WTP and ability to design finance mechanisms. Regulating services in particular may create challenges when trying to estimate and monitor marginal benefits from oxygen or nutrient cycling. The additionality of the benefit, compared to a baseline, would be very difficult to measure and communicate.

If no beneficiary or user groups is willing or able to pay, it may call into question the validity of the MPA designation in the first place. For instance, if the users have only a loose connection to the area (and thus relatively low WTP), it might indicate relatively low human pressures and thus that the area does not need protection in the first place.

4.2 Finance Mechanisms

A finance mechanism is an instrument to enable funding to flow from the revenue sources (4.1) to the O/HMPA management activities. There are hundreds of conservation finance mechanisms, and the most comprehensive catalogue is maintained by the United Nations Development Program - Biodiversity Finance Initiative (UNDP - BIOFIN, 2017). In order to identify the finance mechanisms that are most relevant to O/HMPAs, a four-step screening process has been undertaken. First, the BIOFIN catalogue includes multiple types of financial solutions, but only solutions that generate revenue (finance mechanisms) were considered. Next, mechanisms were screened to exclude mechanisms with low relevance to O/HMPAs, mechanisms that only have the potential to generate a small magnitude of revenue due to high transaction costs.

Taxes

Taxes can be levied on businesses to disincentivize bad or harmful practices while at the same time generating revenue for marine protection. In an Offshore and High Seas environment, this could include taxing the shipping industry and extractive industries as well as the commercial fishing industry, to encourage more sustainable and climate-friendly practices (Andrews et al, 2020a). A higher tax on fuel, for instance, can help to more effectively value non-renewable natural capital and to internalize the cost of biodiversity degradation caused by resource extraction. For the fishing industry, policies that encourage more sustainable fishing practices can reduce pressures on fish stocks (UNDP, 2017).

Corporate Social Responsibility (CSR) tax is a 'special form of government taxation that requires (usually large) companies to spend a percentage of their profits every year on CSR - usually through financing NGOs (Non-Governmental Organizations) or paying into government social investment funds. The main difference from traditional taxation is that the companies will be able to decide where to invest and implement programs' (UNDP, 2017) While CSR tax revenues have been of limited benefit to marine conservation and biodiversity in general thus far, there is potential for the future in e.g., implementing CSR regulation for large extractives (UNDP, 2017).

Revenues from taxes, fees or other financial revenue from marine related resources can be ear-marked to be used for marine conservation related activities. The retention or return of these revenues can help incentivize various actors, increase funding available, and improve service provision.

Fees & Royalties

Introducing a license or permit fee system to users of marine areas is another way to control harmful behavior while at the same time generating finance for conservation. Users would apply and pay for a fee in order to operate in the area. This includes fees charged to the fishing industry, as well as royalties on extractive industries (Andrews et al, 2020a). The rate can be structured in several ways, e.g., a percentage of the gross income by the operator, the number of yearly customers served by the concession, or an annual fixed fee (IUCN, 2000).

For example, fishing permits and access fees are a well-established tool in controlling fishing efforts. In reality, however, access fees fall short of covering the true environmental cost and are overridden by sectoral subsidies. Moreover, the revenues are often channeled back into national budgets and while some percentage is likely reallocated to the Ministry of Fisheries and/or respective enforcement agencies, little is earmarked for ocean conservation and/or rehabilitation. Nonetheless, new initiatives and partnerships are being developed to allow the fishing industry to better contribute to MPA financing.

As it pertains to the shipping industry, the Ocean Recovery Alliance (2016) describes a potential revenue generation scheme for ocean conservation efforts proposed by the Ocean Appreciation

Program. The scheme proposes a fee per container shipped across the ocean and calculates potential revenue of USD 3 billion annually.

User fees for tourists, such as entrance fees to a protected area, is a potential revenue stream for O/HMPAs, but will be limited depending on the remoteness of the MPA. Diving, cruise ships, and yacht tourism are examples of activities that can form the basis for a fee structure. While the cruise shipping industry has traditionally been challenging to extract fees from, an opportunity might exist post-pandemic to engage them at the intergovernmental level, for instance through the World Tourism Organization. New activities might also be developed, such as deep-sea submersibles or spawning/nursery ground tourism. The MPA fee in Galapagos is one example. The revenue from the fee goes to the Treasury, and then 50% is paid back to municipalities to address livelihoods of artisanal fisheries in order to reduce pressure on biodiversity (Andrews et al, 2020b). Tourism, however, has several key limitations for O/HMPA finance: 1) tourism revenues remain vulnerable to diversion of funds into central government budgets, 2) tourism revenues are dependent on external events, as the COVID-19 pandemic has shown, and 3) access to O/HMPAs for tourists and tourism operators may be challenging and not economical. The impacts of over-tourism on the marine environment must also be considered.

Fees may be charged as compensation for planned environmental damage caused by companies, private individuals, or governments. Compensation levels can be either fixed amounts, calculated relative to investment or company size, or based on remediation costs and economic damages (UNDP, 2017). This may have more relevance to OMPAs as government permits would be required; governance systems in HMPAs are not yet advanced enough to allow for compensation for planned damage.

Bioprospecting fees are ‘the systematic search for biochemical and genetic material in nature in order to develop commercially-valuable products for pharmaceutical, agricultural, cosmetic and other applications. The rationale is to extract the maximum commercial value from genetic resources and indigenous knowledge, while creating a fair compensation system that can benefit all’ (UNDP, 2017). In an O/HMPA setting, this could potentially be relevant to the marine biochemicals industry.

Royalties may be charged for extractive commercial uses, for example, as a percentage of the profits of marine bioceutical extraction.

Offsets

UNDP (2017) defines biodiversity offsets as “measurable conservation outcomes resulting from actions designed to compensate for significant residual biodiversity loss arising from project development after appropriate prevention and mitigation measures have been taken”. In an Offshore and High Seas setting, offsets could be relevant to the fisheries industry (bycatch offsets) or other actors doing harm such as the shipping industry (oil spill offsets). For the shipping industry, Thiele & Geber (2017) suggests shipping industry commitments both through the International Maritime Organization and through voluntary offsets.

Fines and Penalties

Revenue can be drawn from penalties imposed on a company or individual 'condemned for an environmental crime and/or unintentional damages to the environment. Prevalent environmental crimes include illegal wildlife trade, illegal waste, man-made disasters and spills, etc. Charges can include fixed fines, remediation costs, and economic damages. The compensation is usually determined by the law. The amount of the compensation might be determined by an assessment of economic loss and remediation costs' (UNDP, 2017). OECD (2017) notes that fines collected for environmental damage can be used to finance long-term conservation programs, and not simply to clean or offset any damage. In an O/HMPA setting, penalties could be charged for oil spills, for instance. In Canada, for instance, proceeds from fines imposed following an oil spill were used to create an Environmental Protection Fund for the Gilbert Bay MPA.

Credits

Investors can offset carbon emissions by buying carbon credits from private companies, NGOs, or MPA managers, who use the funds for projects that help reduce/store greenhouse gas emissions (Hagedoorn et al, 2017). Carbon credits in the marine environment are often termed "blue carbon." Although blue carbon lags behind more terrestrial efforts, advances are being made. For those industries that rely solely on the ocean for transport and contribute significantly to greenhouse gas emissions, such as the shipping industry, carbon credit schemes that focus on blue carbon/high seas offsetting efforts should be encouraged. Other new ideas include carbon credits for offshore seaweed farming, whale carbon, reef carbon, and oxygen credits. Blue carbon is still in research and development phases, with many technical and legal challenges to be resolved. If blue carbon sequestration can be better quantified, such new products could allow for the allocation of High Seas carbon certificates as a funding source (Thiele & Gerber, 2017). Blue carbon credits are being explored in the offshore and high seas environment through new initiatives in offshore seagrass and phytoplankton schemes, although these are at very early conceptual stages.

Bonds

A bond is a debt instrument. Green bonds and blue bonds use the proceeds of the bond for environmental benefits. As the bond capital must be paid back with interest, bonds are only appropriate when there is commercial activity that generates revenue (commercial investors) or in cases when a significant government savings can be expected due to a management intervention.

Green bonds are based on the International Capital Market Association's Green Bond Principles (2018). While the green bond principles allow for blue bonds, there is not yet a universal standard for blue bond issuance. The Blue Natural Capital Positive Impacts Framework provides principles for the issuance of blue bonds (Roth et al, 2019). The Asian Development Bank (ADB) has launched an Ocean Finance Framework to define blue bond project eligibility. In 2018, the

Republic of Seychelles launched the world's first sovereign blue bond aimed at making the country's fishing industry more sustainable. In 2020, the Bank of China launched a blue bond focused on wastewater treatment and marine renewable energy. In the context of O/HMPAs, blue bonds may be appropriate if significant, sustainable commercial activity is allowed in the MPA.

Loans

Loans are another debt instrument, but they do not carry the same minimum transaction size as bonds. Green and blue loans could come from multilateral development institutions such as the ADB and the World Bank, or multilateral development banks like the Green Climate Fund (Thiele & Gerber, 2017). The Adaptation Fund for instance, administered by the World Bank, has as one of its aims to invest in "climate-smart ocean economies". Wave and tidal energy are an example of a growing sector that could also benefit from "blue lending" in the future. So far, the returns of the industry are too low to attract equity from venture capital sources or public equity markets, but the use of e.g., loan guarantees to cover the risk of default, could help leverage more finance into the ocean energy sector (in a loan guarantee the loan is guaranteed by a third party, for instance a government, in the event that the borrower defaults) (Economist Intelligence Unit, 2015; Thiele & Gerber, 2017).

Enterprise Challenge & Innovation Funds, and Impact Investments

Enterprise challenge and Innovation funds are funding instruments that distribute grants (or concessional finance) to bankable projects on a competitive basis. The mechanism helps subsidize private investment in developing countries and risky sectors, including ocean-based sectors. The projects are expected to generate a financial return alongside measurable social or environmental outcomes. Challenge funds can mitigate market risks, while spurring innovation to fight poverty and reduce environmental degradation (UNDP, 2017). One example is Convergence, which recently awarded a grant to Blue Finance for the design of the "Blended Blue Finance Facility" which will support effective management of MPAs in Southeast Asia (Convergence, 2020).

Impact investments are 'investments made into companies, organizations, and funds with the intention to generate measurable social and environmental impact alongside a financial return' (UNDP, 2017). The sector is still small but growing; The Global Impact Investment Network reported the worth of deals increasing from USD 35 billion in 2017 to almost USD 69 billion in 2019, albeit little makes its way into conservation at this stage (MPA News, 18 Dec 2020). One example in a marine conservation setting is the recent impact investment into the "Arrecifes del Sureste" MPA, one of the largest MPA in the Caribbean. Blue Finance, a social enterprise working on sustainable finance for MPAs, secured debt financing for the MPA from impact investors, blended with philanthropic donations. USD 2.5m was secured upfront, and the loan is secured for an 8-year period at an above market-interest coupon rate with a 2-year grace period before lenders receive payments (UNDP, 2020).

Debt for Nature Swaps

In a debt for nature swap the sovereign debt of a country is partially or fully forgiven by its creditors and in exchange the debtor government commits to investing the accrued savings in conservation or climate related expenditures or both. The restructuring can be either public/bilateral, negotiated between creditor and debtor governments, or private/commercial, where a third-party donor agrees to buy a part of the indebted country's debt at a reduced value (UNDP, 2017; Andrews et al, 2020a).

Under the Seychelles Conservation and Climate Adaptation Trust (SeyCCAT) debt for adaptation swap the Seychelles government used private philanthropic funding and loan capital raised by TNC's NatureVest to buy back USD 21.6m of its sovereign debt at a discount (InterAction, 2018). One of the conditions linked to the debt conversion was the development of the Seychelles Marine Spatial Plan; another was the creation of SeyCCAT, which provides a funding mechanism for the long-term financing of activities related to the stewardship of Seychelles' ocean resources and blue Economy (Sumaila et al, 2020).

Grants and Donations

NGOs and foundations use fund-raising strategies and marketing campaigns to raise funding from private individuals. Examples of major philanthropic organizations that have contributed to conservation include the Gordon and Betty Moore Foundation, Bloomberg Philanthropies, the Walton Family Foundation, the Packard Foundation, Pew Charitable Trust, and many others (Meyers et al, 2020). In December 2020, the GEF approved a grant of USD 3m to fund an Ecosystem Diagnostic Analysis of the Sargasso Sea and the development of a Strategic Action Programme for the future stewardship and sustainable governance of the Sargasso Sea (Sargasso Sea Commission, December 2020).

Corporate donations can take the form of direct-giving programs, the set-up of private foundations, or public charities (UNDP, 2017).

Blasiak et al (2019) note that philanthropic organizations are becoming increasingly significant players in the world of ocean finance and show considerable growth potential. Philanthropic support for oceans exceeded ODA funding for the first time in 2015. Nonetheless, since 2009 philanthropic support for oceans has accounted for less than 1% of all philanthropic spending globally. Donor funding also remains erratic and often comes with restrictions on how and when funds can be used. For instance, donor funding is often limited by short timeframes of around 3 years while funding is often needed for 10+ years (Andrews et al, 2020a).

Trust Funds

Conservation Trust Funds (CTFs) are defined by the Conservation Finance Alliance (CFA) as "private, legally independent institutions that provide sustainable financing for biodiversity conservation" (CFA, 2014). CTFs typically manage a pool of financial assets with the aim to generate a financial return in order to sustainably finance the implementation of conservation

programs (Andrews et al, 2020a). CTFs could be used to provide funding for both recurring operational costs as well as contingency funding of O/HMPAs. The term encompasses conservation funds, carbon funds and other environmental funds; and common types of capital structures include endowment, sinking and revolving funds (UNDP, 2017). In addition to being a supplementary funding mechanism, CTFS are also valuable administration tools in protected area financing and management and have the ability to channel financing from any source.

CTFs have been seen as an important attribute in a number of MPA networks, as well as LSMPAs. Vivid Economics (2018) reports that in a marine environment, CTFs 'have been implemented successfully in nearly all Caribbean islands to handle money from diverse sources and bring together stakeholders with varying capabilities and interests'. In eastern Indonesia, the Blue Abadi CTF is an important component in sustainably financing the Bird's Head Seascape network of MPAs (Andrews et al, 2020a). For more remote LSMPAs, CTFs can prove one of only a few viable funding mechanisms (Republic of Kiribati, 2015).

There is also potential in developing a global finance structure in the form of a trust fund targeting the high seas. The ongoing discussion on the adoption of a High Seas Treaty to fill the global legal vacuum on ABNJs is promising in that regard. GEF is a potential partner as it already has investments in ABNJs through the Sargasso Sea project.

Public Budgets

While governments today are the largest funders of MPAs (Iyer et al, 2018), there is potential for further growth: The UNDP (2018) record total biodiversity expenditures accounting for, on average, between 0.03% and 0.94% of country's GDP, or between 0.14% and 4.6% of public budgets. Hypothecation (earmarking) and fiscal transfers within the government help redistribute tax revenues across government levels towards marine conservation outcomes. As Walsh (2018) notes, 'integrating ecological services means including conservation indices (e.g., size/quality of protected areas) in the fiscal allocation formula, thus rewarding investments in conservation and incentivizing the expansion of protected areas, forests or other natural capital'.

Government finance may play a role in blended finance solutions by de-risking transactions and thereby help attract private sector investments and development of innovative mechanisms that involve private capital. Apart from co-financing solutions, governments can also help develop a regulatory environment conducive to private sector investments, for instance through improved fisheries policies as well as monitoring control and enforcement to reduce Illegal, Unreported and Unregulated (IUU) fishing, or "setting up investible entities that can substantially lower transaction costs and aggregate sustainable projects in a way that they become more investible" (Sumaila et al, 2020). Stakeholder consultations pressed that if investors cannot see the investment opportunity, private capital will not flow. A recent blended finance solution was the Seychelles debt swap, for instance, the International Bank for Reconstruction and Development promised to pay a third of the principal, and the Global Environment Facility (GEF) provided grant funding. A global solution could be the set-up of a multilateral Ocean Sustainability Bank to draw in private capital and distribute to MPAs, both within and outside of EEZs. Organizations like Pew have a

role to play in helping to bring relevant stakeholders to the table (Thiele & Gerber, 2017; Stakeholder interviews, this study, 2020).

Subsidies can take the form of direct transfers, tax credits, and regulatory advantages that generate economic or financial benefits to the recipient. Harmful subsidies are subsidies that support harmful practices, such as unsustainable practices in the fisheries sector (UNDP, 2017). Sumaila et al (2020) estimate that around USD 35 billion worth of subsidies are provided to global marine fisheries each year, out of which USD 22 billion goes to harmful subsidies that support unprofitable, large-scale industrial fishing operations, leading to inflated fishing capacities and, by extension, overfishing. Reforming or phasing out such subsidies can result in government savings and funds that can be used for more positive measures instead, such as sustainable aquaculture or renewable marine energy (Sumaila et al, 2020).

Payment for Ecosystem Services

In a PES structure the beneficiary or user of an ecosystem service to the provider of that service in exchange for service provision and maintenance. The beneficiaries/users can make a direct payment to the provider through a private contract or an indirect payment through the intermediation of the State who charges the users through a tax or fee (UNDP, 2017). PES programs have been implemented for watershed management objectives as well as in the forest, agriculture and energy sectors. In an O/HMPA setting, a PES structure could be set up around the pristine marine environment vital to tourism businesses, for instance (Andrews et al, 2020a).

Official Development Assistance

Official Development Assistance (ODA) flows from official agencies of foreign governments to recipient countries, with the objective to address environmental challenges. The funds can be transferred to awarded programs and projects directly or indirectly through accredited agencies, private companies, and civil society organizations. Although the most common disbursement is grant financing, funding may come as concessional loans, guarantees or equity. Increasing ODA flows can be done through e.g., better programming and delivery, training or other targeted efforts (UNDP, 2017).

A recently published book (OECD, 2020) details the volume, scope and nature of ODA dedicated to the sustainable ocean economy over the past decade. It finds that 0.8% of global ODA was dedicated to the sustainable ocean economy between 2013-18 (i.e. ODA targeting ocean conservation and the sustainability of ocean-based industries), equaling USD 1.5 billion/year. Of this, USD 0.3 billion targeted ocean protection specifically during the same time period. The major donors were Japan, the EU, the International Development Association, Germany and France; and the major recipient countries were Indonesia, Vietnam, Morocco, Bangladesh and the Philippines.

Project Finance for Permanence

Project Finance for Permanence (PFP) is an innovative approach for graduating from piecemeal funding initiatives. The Project Finance terminology is borrowed from Wall Street, where a single "closing" is negotiated with government, foundations or private donors to gradually eliminate the gap in protected areas financing. Put differently, PFP is “mobilizing in a single burst of effort all of the elements needed for long-term success” (Linden et al, 2012). The ‘permanence’ element signifies the aim to create a permanent, resilient basic structure and biodiversity of an ecosystem to enable it to flourish for generations to come. PFP is an aggregator of several finance mechanisms, rather than being a finance mechanism itself.

Successful PFPs have been completed in Brazil, Costa Rica and Canada (UNDP, 2017). In Costa Rica, for instance, the Forever Costa Rica project brought together USD 57 millions of new funding from sources outside of Costa Rica to gain agreements from the Costa Rican government to increase its own funding for protected areas, restructure its management agency, and greatly expand its marine network. The project, begun in 2010, aims to permanently protect 1 million hectares of critical marine habitat, as well as 1.3 million hectares of sensitive terrestrial habitat (Linden et al, 2012).

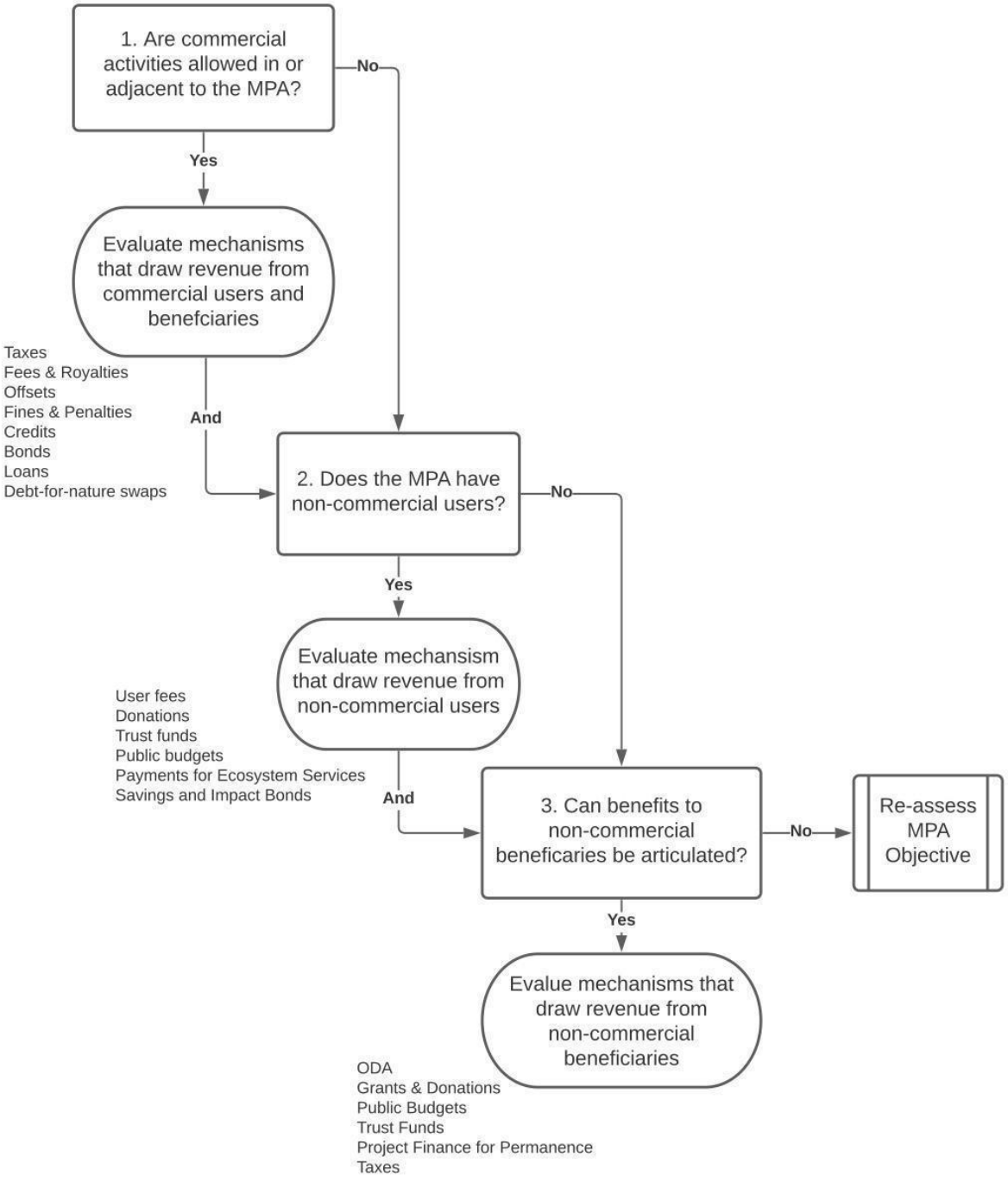
Insurance

There is growing interest in using insurance as a finance mechanism for marine conservation. Insurance is a risk transfer product in which an insurance provider agrees to pay specified financial benefits if and when specific events happen. For conservation, insurance products have been developed to protect governments, companies, and individuals against environmental risks. Parametric insurance, which is one type of insurance in which an insurance payment is linked to a trigger event rather than actual financial losses, has been used successfully to fund the protection and restoration of a coral reef ecosystem in Mexico. Numerous organisations are currently investigating how to replicate this model for other marine conservation contexts. For O/HMPA finance, insurance should only be considered as part of a portfolio of mechanisms, as it only provides revenue after adverse events.

4.3 O/HMPA Finance Mechanism Screening

The first step to select finance mechanisms for O/HMPA is to conduct a screening process to narrow down the universe of finance mechanism options. We recommend using a decision tree that follows a hierarchical approach to identifying finance solutions based on the polluter pays principle and the MPA Finance Principle 4. The decision tree is presented below in Figure 3.

Figure 3. Decision Tree to Screen Finance Mechanism Categories for O/HMPAs



The decision tree first asks: are commercial activities allowed in or adjacent to the MPA? If the answer is yes, the next step is to evaluate mechanisms that draw revenue from commercial users and beneficiaries. These mechanisms include taxes, fees and royalties, offsets, fines and penalties, credits, bonds, loans, equity, and debt-for nature swaps. These mechanisms could be added to a "short-list" for further evaluation (see below). Regardless of the answer to the first question, the next step is to ask, "Does the MPA have non-commercial users?" If yes, the following mechanisms may be added to a short-list for further evaluation: user fees, donations, trust funds, public budgets, payments for ecosystem services, and savings and impact bonds. The third and final question is "Can benefits to non-commercial beneficiaries be articulated"? If yes, the following mechanisms may be added to the short list for further evaluation: ODA, donations, public budgets, multilateral grants, trust funds, PFPs, and taxes.

The decision tree supports a screening process but does not enable the selection of the mechanism(s). Each mechanism on the short list will require careful and site-specific feasibility analysis, which can be guided by the questions in Appendix 4. The reason for the two-step process is that feasibility analysis is very time and resource intensive and screening out mechanisms which do not apply will decrease the time and resource commitment. For example, while blue bonds are very popular and trendy at the moment, in almost all cases they require an economic activity to support the use of proceeds, and therefore are not highly relevant to MPAs without economic activities allowed. Screening out finance mechanisms that are highly unlikely to work in a given context will save managers precious time.

It is important to note the use of the word "and" in Figure 3: over-reliance on polluter-pays mechanisms may create perverse economic incentives that create unsustainable behavior in the MPA, as well as creating risks due to lack of diversification. For O/HMPAs, we recommend starting with a minimum of two revenue sources and diversifying further concomitant with capacity growth. It is important to find a balance between diversification and capacity due to capacity limitations in developing and managing finance mechanisms. An issue for many O/HMPAs is that there are fewer finance mechanisms options due to fewer stakeholders. This means they might need to explore a wider range of mechanisms to tap into a wider network of benefits, which will be costly.

In addition, given the dynamic nature of remote MPAs, the contingency funds may need to be larger than their coastal MPA counterparts (Meyers et al, 2020; Stakeholder interviews, this study, 2020). This may be addressed through the creation of a large trust fund that has a pocket of money for unplanned but priority management actions.

5. Case Studies

For all MPAs, and particularly for O/HMPAs, cost data and drivers (Section 3) and finance solutions (section 4) are very site-specific. General costing rules of thumb and finance recommendations are difficult to make for all MPAs in aggregate. This section presents three hypothetical case studies for the purpose of demonstrating how the frameworks and information presented in Sections 2-4 could be used to evaluate the cost drivers and finance options for three diverse contexts.

The case studies are intended to be realistic but purely hypothetical. Understanding cost and designing finance strategies requires comprehensive stakeholder engagement (see Principle 9, Section 2.1). Engaging with stakeholders of specific MPAs is out of scope for this research project and therefore only hypothetical case studies are included.

5.1 Small Island Developing State - Multi-use OMPA

For case study #1, the hypothetical MPA is situated within the EEZ of a Small Island Developing State (SIDS). The 65,000 sq km OMPA begins at 3 nautical miles offshore and borders the coastal zone. The SIDS is remote and isolated with limited economic opportunity, yet its natural beauty draws in tourists from around the world and its productive waters support both reef and pelagic fisheries.

There was strong political leadership for the OMPA during designation, about ten years ago, but the government's support of the OMPA has waxed and waned with changing administrations. Most of the population does recognize the value of the OMPA, yet other priorities are front and center - including dealing with frequent natural disasters and widespread poverty and food insecurity.

The country’s capital is accessible by a four-hour flight from a developed nation and domestic flights connect the main island to four outer islands. One weekly cargo ship supplies the outer islands. Both domestic and foreign-flag vessels are allowed to fish in the EEZ.

The country has a moderate amount of scientific data on marine resources, which was funded by a development partner during an extensive MSP process. Some stakeholder tension remains after the zoning plan was legislated. The MPA management office is working hard on stakeholder outreach, but their capacity is limited, and they spend most of their time reacting to incidents, such as oil spills, ship groundings, and fisheries breaches. With only one enforcement vessel which is shared with other government departments, compliance is low and the MPA benefits are limited.

5.1.1 Cost Drivers & Cost Efficiencies

This OMPA has a complex set of management objectives, stakeholder needs, and use conflicts. OMPA implementation costs are likely to be high, particularly in the cost categories of personnel, stakeholder engagement, monitoring & enforcement, and data / research (see Table 8). While the location of the MPA (bordering the coastal zone and within one EEZ) decreases some costs, these savings are likely offset by the multi-use nature of the MPA. Each cost category and potential cost efficiencies are further discussed below.

Table 8: Cost Assessment - Case Study 1

		Cost Categories				
O/HMPA Characteristics		**Personnel**	**Transport**	**Stakeholder engagement**	**Monitoring & enforcement**	**Data collection & scientific research**
Governance	**Within EEZ**	**Low-Medium. Single governance structure within EEZ, however high coordinated governance between respective ministries required based on more complex MSP. However, with the MPA fully within the EEZ of the country, costs can be shared with relevant government departments and research bodies across all budget categories.**				
	Both within EEZ and High Seas					
	High Seas only					
Remoteness	**Fairly close to coast**	High. High connectivity to coast allows for more activities, which drive up management costs.	Low per trip cost as close to shore.	High. The proximity to the coast means many stakeholders.	Low. The proximity of the MPA to the coast means patrolling boats have to travel less distance.	Low. Proximity to coast helps reduce research costs due to lower fuel and logistical costs.
	Far from coast but with station/landing					
	Far from coast but with no station/					
Size	Small	As size to manage increases likely that personnel needs may also increase but at a non-linear rate due to economies of scale.	Medium. Island infrastructure helps reduce costs.	As size increases it is likely number of stakeholders will also increase, however this may be offset if pelagic environment remains relatively uniform.	Costs will likely increase as size increases. Efficiencies of scale possible.	Costs will likely increase as size increases. Efficiencies of scale possible.
	Medium					
	Large					
Activities	No-take	High personnel costs per unit of area due to large number of activities to oversee	Medium due to increased frequency of trips due to high number of activities.	High due to high number of stakeholders	High due to high number of activities requiring M&E	High due to high number of activities requiring data for accurate/appropriate use levels/ standards
	1-2 activities					
	Multi-use					
Biological Productivity	Low	Medium. Personnel costs related to large number of stakeholders and research/ compliance needs. Government departments to support within ministry mandates.		Medium-High. Many stakeholders requiring consultation and compromise in a relatively productive area.	Medium-High. Productivity levels will mean some base level of M&E required to induce compliance across the various sectors	Medium-High. Sufficient base line data required across a number of sectors.
	Medium					
	High					

Personnel:
Personnel costs are driven by the large number of stakeholders and activities allowed, which drive up management costs related to enforcement, stakeholder engagement and policy engagement. The SIDS context means the supply of experienced MPA staff may be limited, which may require hiring of outside consultants and drive-up training needs and costs.

Cost efficiencies can be achieved by sharing personnel with other agencies, such as the navy, or ocean-based sectors, such as tourism. For example, the tourism industry could help with entry fee management and on-the-water observation.

Transport:
The relatively small size of the MPA and the proximity to the coast helps keep transport costs down, but these cost savings may be counteracted by the additional costs due to the stakeholder engagement, data collection, and monitoring & enforcement needs of the MPA.

Cost efficiencies can be achieved by sharing responsibilities with other agencies. For instance, other vessel services (such as shipping companies, observers, or tourism operators) can be used for transport of equipment, supplies, and personnel. Transport costs can also be lowered by collaborating with military or police for functions such as surveillance, patrol, and enforcement.

Costs can also be reduced by using strategic locations for headquarters and field offices, and surveillance and patrol. For instance, land-based stations with sightlines where possible and patrols in areas of infractions.

Stakeholder engagement:
Stakeholder engagement costs will be high due to the multitude of stakeholders in the MPA, limited only by its size. Information related to the MPA will need to be shared and socialized with traditional and customary leadership and benefit-sharing mechanisms put in place; and marketing and public awareness campaigns to engage the wider public should be used. Reaching island communities may drive up engagement costs further. Equally, engaging the tourism sector and fishing sector will be time-consuming and therefore costly.

Cost efficiencies may be achieved by using other agencies to share engagement costs, e.g., marketing agencies. Using social media and other online tools for marketing campaigns may help save money too. Social media can also be used for data collection and enforcement, e.g., to capture public perception about the MPA.

Monitoring & Enforcement:
Monitoring & enforcement costs are likely to be driven up by the highly productive waters and many stakeholders of the MPA, but also limited by the MPA's proximity to the coast. Enforcing MPA borders and reducing threats such as IUU can to some extent be reduced by technology, but 'boots on the ground' will still be required. Basic monitoring such as socio-economic impact evaluation will also be costly. The diversity and spatial distribution of drivers of degradation will also drive-up costs.

Cost efficiencies can be achieved by putting in place clear, strong and easily enforceable regulations and legislation. For instance, cost penalties should be high enough to act as deterrents (and could then be tagged for recycling into the MPA budget).

Monitoring & enforcement is likely to remain one of the most expensive cost drivers for many OMPAs, particularly those remote but complex MPAs, such as SIDS. However, as technology and its underlying infrastructure continues to improve, technology costs will decrease and its use will become more cost efficient.

Costs can also be cut by building on existing regional or international monitoring & enforcement platforms; collaboration with relevant law enforcement agencies (navy, police, coast guard); and collaboration with local and international universities and NGOs on impact, biological and socioeconomic monitoring.

Data & Research:
The low level of remoteness of the MPA helps limit data and research costs, but the large number of stakeholders and high productivity means overall costs are likely to be relatively high. Costs are driven by instruments and equipment needed, analysis of data, and potential hiring of external consultants for data collection.

Cost efficiencies can be achieved through collaboration with local and international universities and NGOs and use of citizen science. A regional research hub could be set up where research and data could be shared and streamlined.

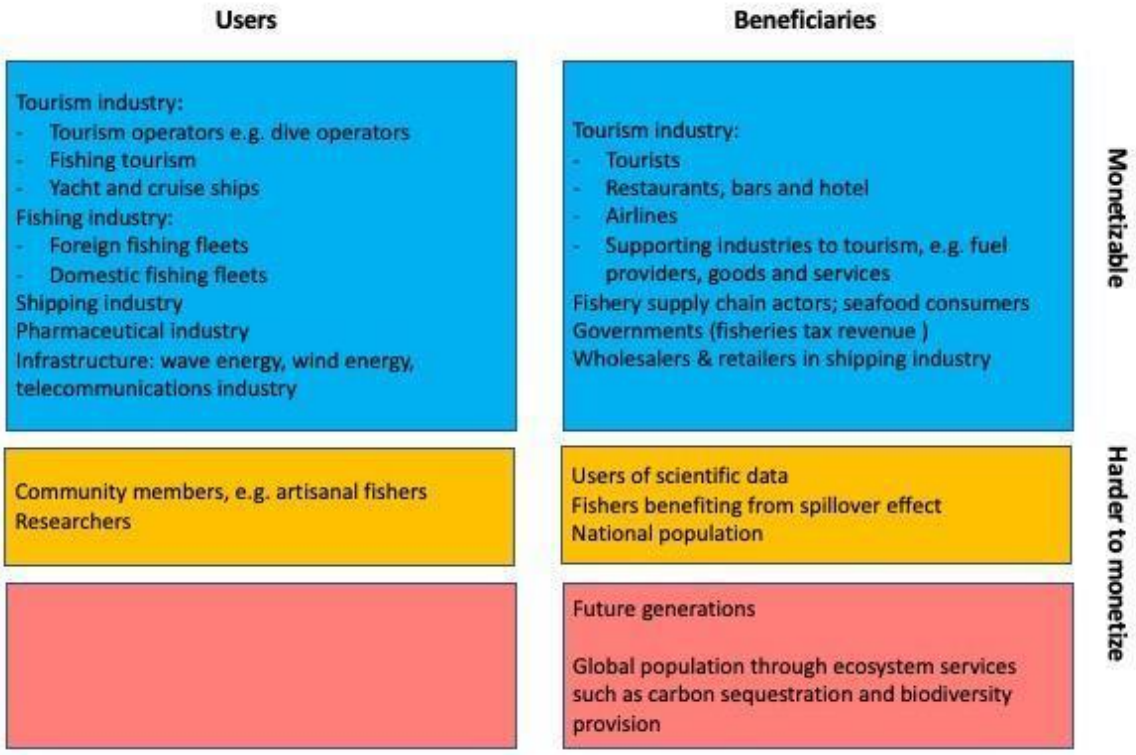
5.1.2 Finance Solutions

Users and Beneficiaries
There are several key commercial industries operating in and around the OMPA including tourism, fisheries, and shipping. Commercial users and beneficiaries include operators, investors, suppliers, and clients, both domestic and international.

Non-commercial use is high in this OMPA, given traditional use of fishing grounds in parts of the OMPA. Non-commercial beneficiaries include direct beneficiaries with strong connections to the MPA (SIDS government and population); however, the ability to pay may be low. Indirect beneficiaries (global population benefiting from carbon sequestration, preservation of biodiversity, and other ecosystem services) are highly relevant, especially development partners of the developing island nation.

Users and beneficiaries can be divided into those that are monetizable and those that are harder to monetize, as shown in Figure 4:

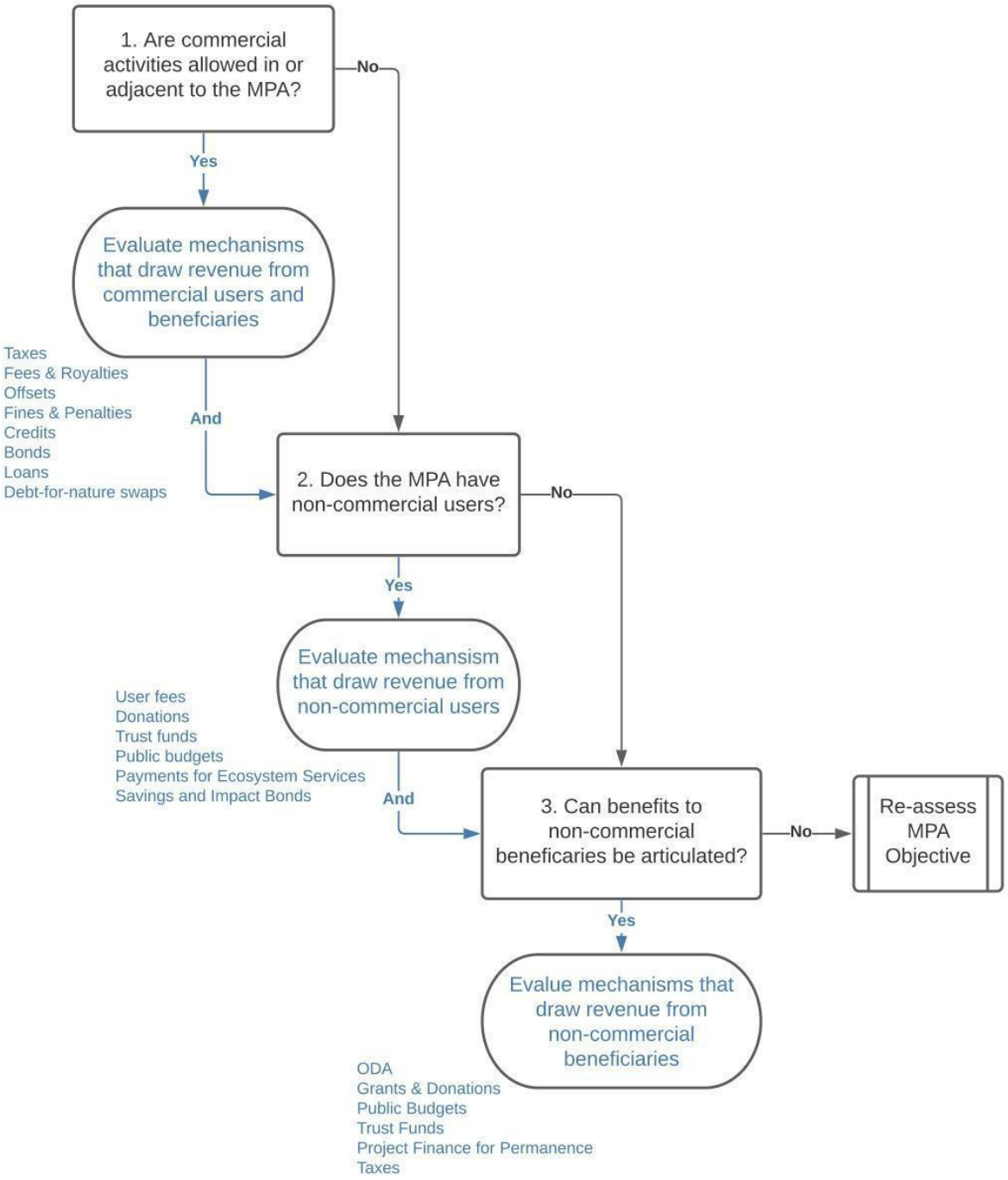
Figure 4: Users and Beneficiaries by ease of monetization



Finance Mechanisms

Given the range of users and beneficiaries, numerous finance mechanisms are potentially relevant (see Figure 5).

Figure 5. Finance Mechanism Screening – Case Study 1



In this case study, the decision tree does not narrow down the list of viable mechanisms, due to the many users and beneficiaries of this MPA. While it is not possible to individually evaluate these options, the generalized recommended approach is to create a finance facility with governance structures to include key government, non-government, and development partners.

The finance facility should be tied to an MPA management strategy that has prioritized and costed actions. The finance facility should then be capitalized by at least three revenue streams, as discussed next.

Domestic Resource Mobilization

The first and most important is funding from the government itself. This is to establish long term ownership of the MPA and consistent, core funding over time. The government may raise revenue to feed into the facility through multiple mechanisms. The mechanisms must be fully analyzed and vetted, but mechanisms for consideration should include tourism taxes and fees, fisheries taxes and fees, scientific permit fees, and if the SIDS has a sovereign wealth fund, a portion of this fund should be considered.

Tourism fees may include entry/ departure fees, but willingness to pay needs to be assessed. Licensing or permit fees for high end tourists, such as luxury yachts and liveaboard dive vessels, may be possible. Hotel taxes are another consideration, particularly if the majority of tourists stay in hotels. For some SIDS, tourists may prefer homestays and village accommodation, which makes this mechanism less viable.

The government may also consider raising resources through the fisheries sector, although there are already complex fisheries permit systems in many SIDS. A relatively new concept to consider is the “blue halo” concept in which fisheries that operate adjacent to MPAs and receive spillover benefits are charged a fee to help pay for the MPA management.

Fees may also be collected from the shipping sector for entry or mooring in the OMPA. Often SIDS already charge port fees to cover port infrastructure and waste management in ports, and this would be in addition to existing fees and diverted specifically to the MPA finance facility.

As a supplement to fees and taxes, the SIDS government may also consider allocating any fines and penalties from OMPA breeches - such as fishing fines, oil spill damages, or ship groundings - to the finance facility. These monies should not be used for core funding, however, as they are unpredictable, and this would create a negative incentive loop.

Fees and taxes will require supportive legislation to establish fee structure, allocation mechanisms, monitoring and evaluation. Capacity to administer and manage fee-based tax systems within government must be developed. The fees/taxes will require discussions and close cooperation with tourism or fisheries operators to socialize, set up and manage the fee system.

Lastly, domestic resource mobilization should also consider the redirection of subsidies that are harmful to ocean health. For example, the government may consider changing current subsidies that promote fishing to a subsidy that is only offered for sustainable fishers. This type of scheme will not generate revenue for the finance facility, but it will be a cost-effective way to support the management of the OMPA.

Development Assistance and Philanthropy

Second, due to the developing nature of the SIDS, the facility should also seek to have revenue coming from development partners including governments, NGOs and philanthropists. ODA and philanthropic donations will play a crucial role in filling the funding gap through a traditional, and time-proven CTF. CTFs form the basis of many MPA financing strategies and their adoption within OHMPA management should be encouraged. When well designed and managed, CTFs are fit for purpose and provide a number of additional benefits to any financing portfolio. These include, to name but a few: the ability to combine numerous financing sources; the ability to finance recurrent costs and facilitate long-term planning; the ability to react flexibly to new challenges and unforeseen costs; the ability to continue finance core costs when expected income declines due to unexpected external events.

CTFs have proven to be an important safety net for a number of MPA financing portfolios this past year during the COVID pandemic. During this time, MPAs which have lost significant annual revenues due to significantly diminished tourism have pulled from endowments to smooth financial shocks.

Sustainable and Bankable Investments

Third, due to the many commercial activities, the use of debt to both incentivize sustainable practices, and generate revenue, should be considered. Due to the relatively small sizes of most SIDS economies, there may not be a sufficient pipeline of bankable projects to warrant the development of a blue bond. Commonly, debt-for-nature swaps are also tricky in SIDS due to both political issues with debt holders and also other factors such as credit and corruption ratings. Instead, a revolving loan fund that offers loans to eligible, sustainable SME businesses could both promote sustainable fisheries and tourism while also reinvesting profits back into the finance facility.

In order to balance financing needs with administrative capacity and allow staff to focus predominantly on management and not funding, it is recommended that no more than three sources of funding should be selected in the first phase; additional mechanisms may be added as human resourcing can be increased.

5.2 O/HMPA with Commercial Fishing and Shipping and Transboundary Issues

This MPA is largely situated in the high seas. Some five years ago the 60,000 sq km HMPA was designated by a coalition of governments with fishing interests in the area. More recently, one of the governments is considering designating a portion of adjacent offshore waters as an OMPA to be managed together with the HMPA; the country plans to designate an additional 20,000 sq km. The O/HMPA is remote and isolated but with a number of islands and atolls scattered throughout its waters. It is visited only by commercial fishers and ships that pass through its waters.

The O/HMPA is characterized by its dynamic pelagic habitat and high fisheries productivity. The O/HMPA is designated as a multi-use MPA which allows for two activities: commercial fishing within certain zones and shipping. Current commercial fishing revenues provide significant income to the partnering countries and targets a number of high-value pelagic species. Some smaller-scale fishing around the islands and reef-beds also occurs within the OMPA of the adjoining country which provides high-value exports to a number of small(er) scale fishers.

Monitoring is mostly via remote channels although a physical landing station does exist which enables MPA and enforcement visitation if and when required. Current management and surveillance operations are a cooperative effort between the governments. However, the governments are looking to bolster management, including surveillance and enforcement, moving away from a paper park status to more active management. There is some conflict between the parties as to how finance should be raised and how responsibilities should be divided.

5.2.1 Cost Drivers & Cost Efficiencies

Based on these characteristics, the highest costs are likely to be related to monitoring & enforcement (see Table 10). These are further discussed below.

Table 9. Cost Assessment - Case Study 2

		Cost Categories				
O/HMPA Characteristics		**Personnel**	**Transport**	**Stakeholder engagement**	**Monitoring & enforcement**	**Data collection & scientific research**
Governance	Within EEZ	Medium. Opportunity to share costs with other government departments within EEZ ; within high seas a cooperation agreement will define responsibility sharing between countries, thus ensuring cost synergies across all budget items. However early negotiations may be costly/time consuming.				
	Both within EEZ and High Seas					
	High Seas only					
Remoteness	Fairly close to coast	Medium. Fewer stakeholders requires less management. However, existence of islands means personnel can be stationed remotely	Medium. The existance of islands can reduce transport needs due to presences of permanent stations and support refueling or resupply vessels.	Medium. Remote nature means fewer local stakeholders to engage with than for coastal MPAs - but reaching island communities may be costly still.	Medium. Presence of physical patrols far out at sea costly but can be helped by island stations and more remote surveillance.	Medium. Satisfying data needs will be more challenging than for coastal MPAs but again costs can be lowered due to island stations.
	Far from coast with station/landing doc					
	Far from coast but with no station/					
Size	Small	As size to manage increases likely that personnel needs may also increase but at a non-linear rate due to economies of scale.	Medium. Island infrastructure helps reduce costs.	As size increases it is likely number of stakeholders will also increase, however this may be offset if pelagic environment remains relatively uniform.	Costs will likely increase as size increases. Efficiencies of scale possible.	Costs will likely increase as size increases. Efficiencies of scale possible.
	Medium					
	Large					
Activities	No-take	Medium. The relatively few activities allowed makes it cheaper to run than a multi-use MPA.		Medium. While there are only a few users it can be very expensive to consult with commercial fishing sector.	Medium-High. Commercial fishing and shipping element means relatively high enforcement needs - and costs.	Medium. Commercial fishing and shipping element means greater data collection
	1-2 activities					
	Multi-use					
Biological Productivity	Low	High. High productivity levels means more data collection needs, which will drive personnel costs up.		High. High productivity will mean a lot of fishing activities - and more stakeholders	High. High productivity is likely to increase the threat of IUU fishing.	High. The high productivity level means more data to collect.
	Medium					
	High					

Personnel:
Personnel costs are likely to be dependent on the level of activity, and stakeholders in the fishing and shipping industry, as well as local communities who might be located on remote islands. Similarly, some personnel may be stationed remotely. Relatively high data collection and monitoring & enforcement needs will increase personnel costs.

Cost efficiencies could be achieved through virtual trainings and meetings, and through partnerships with external entities that can provide technical assistance to personnel. Where possible, partnering countries should seek to share personnel costs and/or personnel expertise to achieve cost efficiencies.

Transport:
There will be costs related to transport to the outer parts of the OMPA, but island infrastructure can help reduce costs. To achieve cost efficiencies, autonomous vessels could be used, and base stations could be located around known biological hotspots such as seamounts and collect both scientific and surveillance info. Transport costs could also be shared with other agencies such as the navy.

Stakeholder engagement:
Even though stakeholders are few, there will be a need for meetings with stakeholder groups in all three countries. Professional facilitators could be hired given the number and diversity of stakeholders and the potential for conflict. This will drive costs up.

There will also be costs involved in securing political support from three countries. In general, an HMPA will run higher administration costs related to multi-country collaboration and negotiation, and legal issues related to management and enforcement, than MPAs that fall within the national jurisdiction of a country. These costs could be managed, to some extent, through the early development of collaboration agreements; cost-sharing arrangements across budget categories; and knowledge and skills sharing between the partner countries.

Monitoring & Enforcement:
Monitoring & enforcement costs are likely to be relatively high for this MPA due to the presence of both shipping and fisheries industries, combined with high biological productivity which increases the risk of IUU fishing. Costs will be related to e.g., remote sensing, satellites, drones, AUVs, etc., as well as VMS data analysis and non-voluntary monitoring (e.g., visual satellite and SAR).

As with HMPAs, there will be additional costs related to governance in this MPA. There will be huge legal costs related to governance agreements, extraction agreements, common evidentiary requirements, which take a lot of time to negotiate. The addition of some offshore waters of one of the partnering countries to the HMPA will be particularly challenging.

There will also be costs related to prosecution; different laws under different jurisdictions will need to be aligned, and new laws created.

To drive down costs, a centralized and harmonized authority for issuing permits, managing access, monitoring, and stakeholder engagement could be created. This could help streamline policies, regulations, budgets, and facilitate coordination across countries, ministries, regional fisheries management organizations, and other agencies/institutions.

If monitoring & enforcement costs could be better shared between partnering countries that could help reduce costs, for instance through closer cooperation with and between each country's navy/military. Developing monitoring & enforcement systems and processes are developed at an early stage also saves costs later on. This includes putting in place regulations that are clear and easily enforceable, such as state agreements that in advance agree to hand over captains and responsible owners to the jurisdiction of the enforcement body.

Data & Research:
High productivity level and fishing and shipping activities will drive data collection and research needs. There will be a high migratory species presence; fisheries research needs (e.g., maximum sustainable yield calculations); and climate change research needs (e.g., impacts on fish stocks and other species distribution). Data sharing agreements between partnering governments may be costly to set up. Costs may be lowered through the presence of island stations.

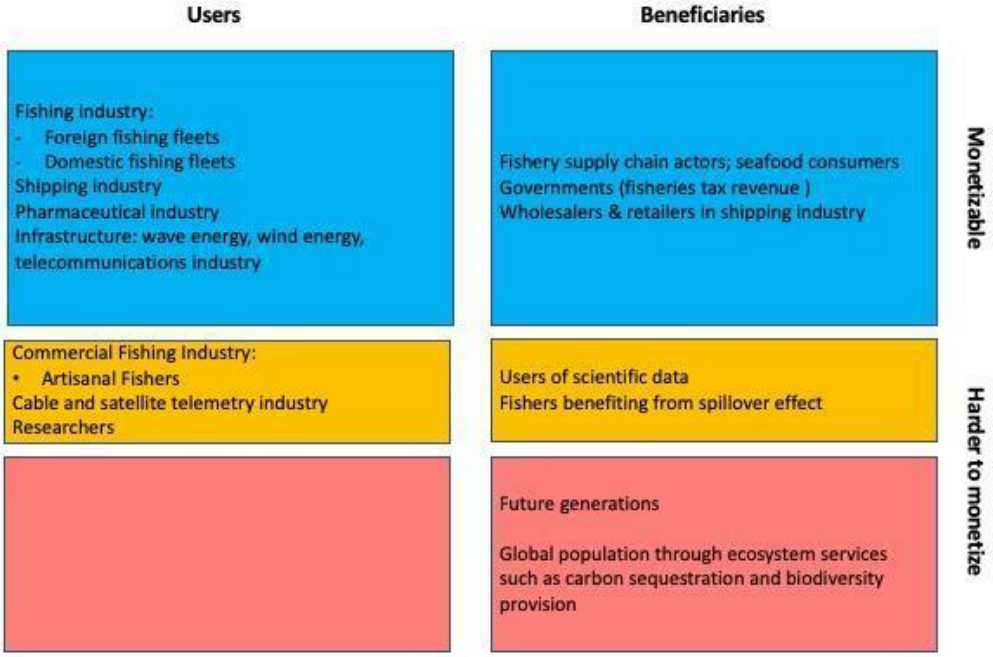
Cost efficiencies could be achieved by setting up research & data sharing agreements between partnering countries; and by applying data-limited approaches where possible to limit need for costly stock assessments. Partnership could be developed with universities and industry with mutual research interests.

5.2.2 Finance Solutions

Users and Beneficiaries
The predominant users and beneficiaries are commercial users (fishing and shipping companies) and commercial beneficiaries (sustainable fishing and shipping impact investors. Additionally, there are direct beneficiaries (governments owning adjacent waters with spillover fisheries benefits) although the connections are harder to monetize for these groups. Given the weak direct beneficiary links, indirect beneficiaries (global population benefiting from carbon sequestration, preservation of biodiversity, and other ecosystem services) may play a critical role in funding the HMPA. These dynamics are captured in Figure 6.

In addition, MPA management in this transboundary MPA should consider how payments should be split between offshore and high seas users and/or beneficiaries.

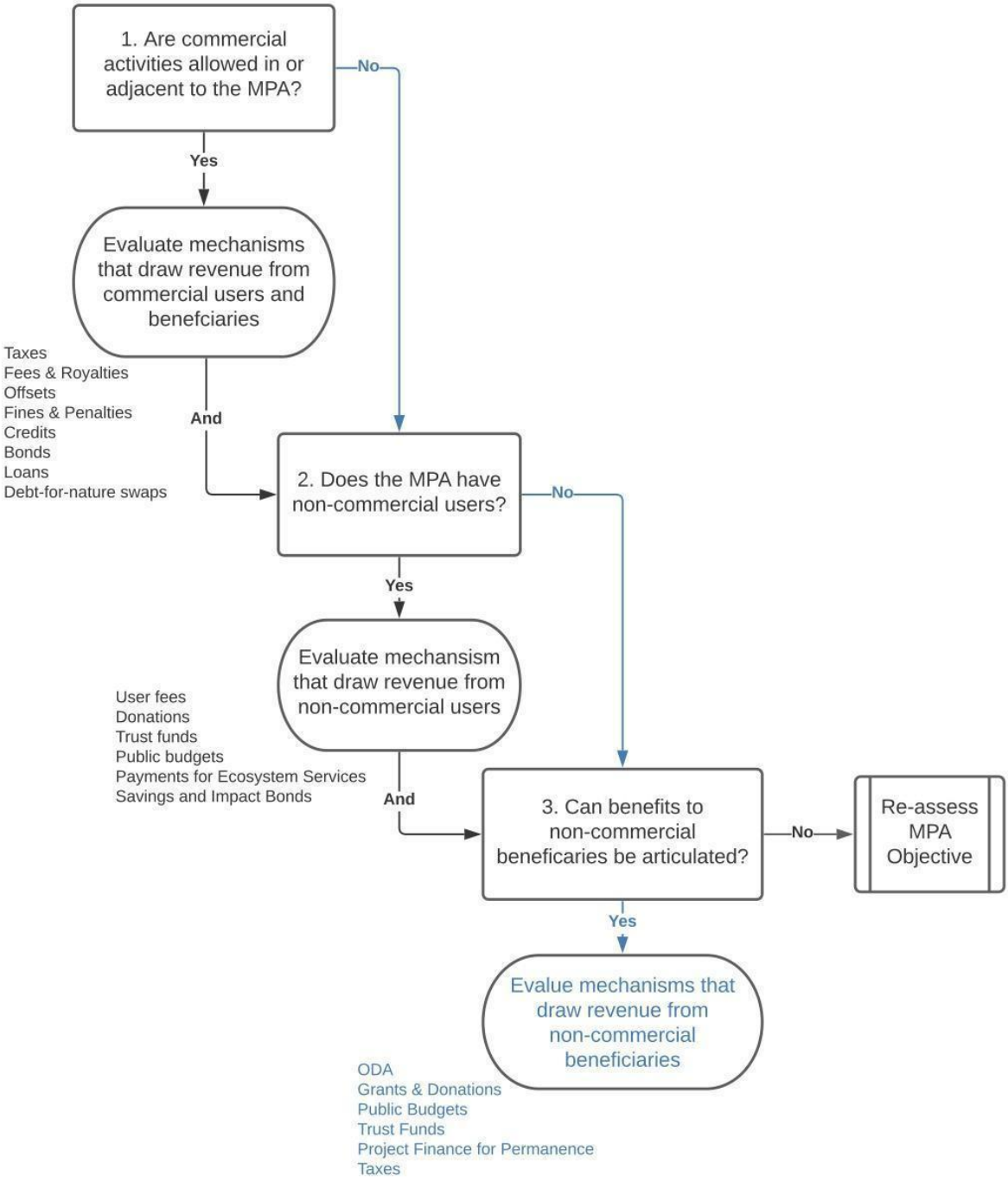
Figure 6: Users and Beneficiaries by ease of monetization



Finance Mechanisms

In this case study, the decision tree helps to slightly reduce the number of finance mechanisms under consideration (see Figure 7). Compared to Case Study 1, mechanisms which involve direct non-commercial users have been removed.

Figure 7. Finance Mechanism Screening - Case Study 2



The primary challenge with funding this MPA is blending revenues derived from the high seas and offshore components of the MPA system. The following portfolio of mechanisms may be considered.

Domestic Resource Mobilization - Offshore Component

All of the mechanisms presented above in Case Study 1 for domestic resource mobilization would also be applicable to this case study, with the exception of the mechanisms reliant on tourism since there is no tourism in this MPA.

Commercial Use and Benefit Fees - High Seas Component

In the high seas area of this MPA, the only permitted activity is shipping. Under the United Nations Convention on the Law of the Sea (UNCLOS) ships are allowed to pass through HMPAs. However, UNCLOS does not necessarily prevent the collection of fees associated with passage. It may be possible to introduce a global system whereby countries collect fees at ports for passage through HMPAs. This would require an international treaty and would benefit multiple HMPAs, and therefore a global fund may be required to distribute the revenue to the most appropriate MPAs. It would also be suitable to consider a discount on fees for ships that use best practices for environmental issues such as energy consumption, pollution, and invasive species control.

To further incentivize participation from the shipping industry, it may be possible to positively partner between ocean data providers and the shipping industry on services or tools that save the industry money in exchange for transit fees. For example, data on wind routes may benefit passage of hybrid vessels.

While fishing is not allowed in the HMPA, there is likely spillover benefit to adjacent and nearby fisheries. This is one of the hardest benefits to monetize, but recent scientific analysis provides additional evidence that fisheries spillover benefits from HMPAs are real and quantifiable (Sweeney 2021).

Development Assistance and Philanthropy - Offshore and High Seas Components

Just as case study 1, a CTF with dedicated ODA and philanthropic donations is quite appropriate and needed for this case study.

Offshore Blue Carbon

Given that the MPA is largely high seas, with a small offshore component but without tourism or direct users, more innovative approaches may be required to meet the full operation costs.

Blue carbon is being considered for offshore and high seas applications and could possibly provide a source of funding. In the remote marine waters, the more well-understood blue carbon

ecosystems like mangroves and coral reefs are largely absent. Instead, these waters do provide habitat for seaweeds and phytoplankton to grow by sequestering carbon from the atmosphere.

5.3 No-Take HMPA

This 150,000 sq km MPA is situated in the High Seas, in an area beyond any national jurisdiction, and far from island or coastal communities. Over twenty years ago, the HMPA was designated by a coalition of three developed nations who expressed fishing and oil interests in the waters and seabed. After an environmental advocacy campaign, the HMPA was designated with the primary management objective of protecting migratory marine mammals and commercially important fish species. Political support for the HMPA fluctuates within each of the designation countries. Very few people from each of these countries have ever visited the far-away HMPA.

The HMPA was designated as a no-take MPA, that disallows fishing, tourism, and all extractive uses. Several shipping routes pass through the HMPA and passage is allowed, as long as no extraction takes place. Scientific exploration is permitted under the law of the sea even in no-take MPAs.

The HMPA is staffed by one part-time manager who is funded through short term grants from non-profit organizations and private foundations. The manager spends considerable time looking for funding and managing the various reporting requirements associated with short term grants. The manager is aware of illegal fishing happening within the HMPA but does not have access to a vessel or an enforcement team.

The HMPA is home to several endemic and endangered species and is often featured in major glossy magazines for its beauty and rugged environments. The HMPA has some of the deepest underwater canyons on earth, and scientific explorations have found evidence of potentially valuable deep sea mineral deposits.

5.3.1 Cost Drivers & Cost Efficiencies

Given these characteristics, the highest costs are likely to be related to transport, monitoring & enforcement, and data / research, as shown in Table 10 and further described below.

Table 10: Cost Assessment - Case Study 3

O/HMPA Characteristics		Cost Categories				
		Personnel	**Transport**	**Stakeholder engagement**	**Monitoring & enforcement**	**Data collection & scientific research**
Governance	Within EEZ	Medium. The cooperation agreement sets the areas of responsibility for each country, thus ensuring cost synergies across all budget items. However early negotiations and gaining government by-in may be costly/time consuming.				
	Both within EEZ and High Seas					
	High Seas only					
Remoteness	Fairly close to coast	Low. Few stakeholders and few activities.	Any visit to O/HMPA likely expensive as must solely rely on shipping vessels.	Medium. The remote MPA with limited habitable island is associated with fewer stakeholders, however these stakeholders are dispersed over three countries	Medium. Remoteness drives costs of M&E up.	High. Distance from shore, lack of landing/auxiliary station and general data gap in the high seas increase costs.
	Far from coast but with station/landing					
	Far from coast but with no station/					
Size	Small	Low. Economies of scale means per unit of area cost for personnel is driven down.	Large area to cover and can be carried out by boat only	Medium. Although remote nature means fewer likely stakeholders, large size may serve to increase respective stakeholders/size of stakeholder groups.	High costs associated with large size as well as no auxiliary stations to support logistics.	High. Large size and general data gap in the high seas increase costs.
	Medium					
	Large					
Activities	**No-take**	Low. Few stakeholders and activities to deal with on day-to-day basis.	Medium. Few visits needed but high costs associated with each.	Low-Medium. Few stakeholders and activities to deal with on day-to-day basis. However some outreach needed at MSP stage	Medium. With no activities allowed the M&E need decreases - although it will always be needed as a deterrent and likely costs associated with border enforcement still exist	Low. Data needs lower as no commercial 'take' requires monitoring/reassessing.
	1-2 activities					
	Multi-use					
Biological Productivity	Low	Medium. Will require some oversight.		Productivity of area will likely mean a reluctance by current users to change.	Medium. Although no-take, medium productivity will require some oversight and enforcement to reduce poaching	Medium. Data needs lower as no commercial 'take' requires monitoring/reassessing. However, data likely still needed on understanding trends in key species and spill over effects
	Medium					
	High					

Personnel:
Personnel costs in this MPA will be limited due to the limited management requirements, although engaging stakeholders from all three countries will drive costs up. Costs may also increase if it is decided that more staff is needed for effective enforcement.

Cost efficiencies could be achieved by sharing staff with other enforcement agencies; partnering countries; or, if there are other MPAs nearby, by sharing staff and expertise.

Transport:
It is common modern practice for HMPAs to not have any transport into the HMPA directly, but instead to rely on Port State Measures Agreements to do compliance work at ports. It is not feasible for HMPA managers to own or operate their own vessels.

Stakeholder engagement:
Even though stakeholders are few, there will be a need for meetings with stakeholder groups across the world. Professional facilitators could be hired given the number and diversity of stakeholders and the potential for conflict. This will drive costs up.

There will also be costs involved in securing political support from relevant countries. In general, an HMPA will run higher administration costs related to multi-country collaboration and negotiation, and legal issues related to management and enforcement, than MPAs that fall within the national jurisdiction of a country. These costs could be managed, to some extent, through the early development of collaboration agreements; cost-sharing arrangements across budget categories; and knowledge and skills sharing between the partner countries.

To reduce costs, virtual tools and online meetings for educational activities as well as stakeholder engagement should be used where possible. Partnering with corporate sponsors could not only bring in funds but also help bear some of the marketing costs by showcasing the MPA to the wider public.

Monitoring & Enforcement:
As mentioned above, Port State Measures Agreements can be used to conduct fisheries compliance at ports through partners. In addition, partnerships with commercial airlines to help with surveillance (has successfully been done in the Pacific, for instance); military to help with surveillance and enforcement; and existing marine surveillance agencies. Closer collaboration between the partnering countries would help further reduce monitoring & enforcement costs, as would the use of technology.

Data & Research:
The distance from shore and the lack of an MPA-dedicated vehicle will drive up data and research costs. The no-take nature of the MPA will mean limited data collection needs, but will still be needed on e.g., catches by fisheries fishing near the MPA. Research will also still be needed to understand abundance and trends in key species, and spillover effects outside of the MPA border.

Cost efficiencies could be achieved through improved collaboration between the countries involved to share data and research, as well as cost-sharing of scientific explorations. Partnerships could be developed with universities, governments or other researchers on projects of mutual interest. Cruise liners or the military could be used to bring scientists to the study region.

5.3.2 Finance Solutions

Users and Beneficiaries

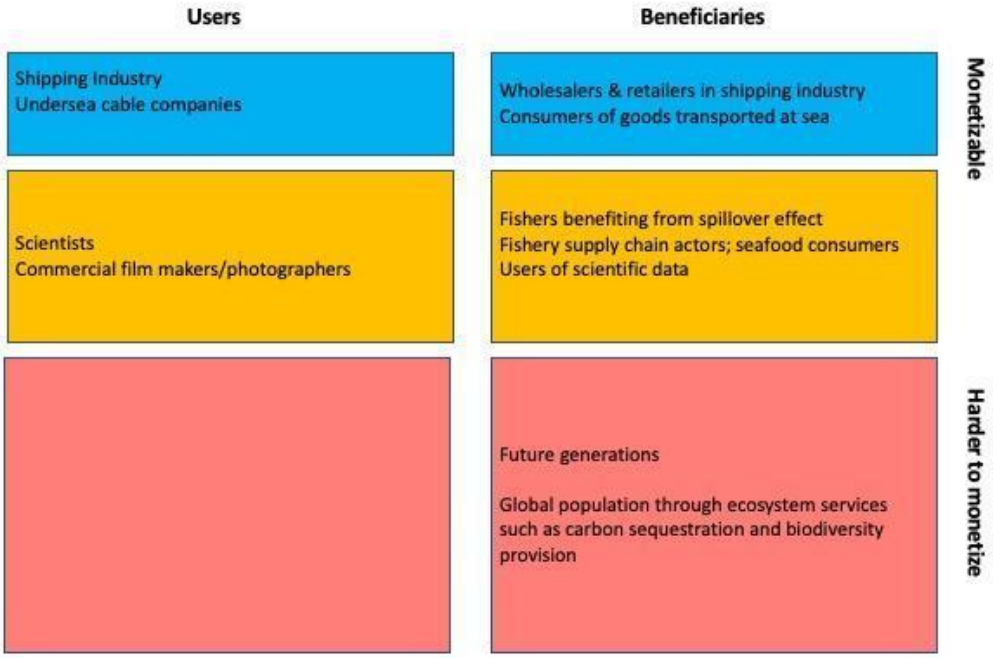
The only commercial sectors operating within the HMPA are shipping operators who pass through. There are no legal fisheries, tourism, or mineral extraction operators using the HMPA. There are several commercial fisheries operating just outside the HMPA in adjacent waters, likely benefiting from spillover benefits.

The only non-commercial users are occasional scientists.

Non-commercial beneficiaries of the HMPA include the populations of the countries that designated the MPA, global populations benefiting from carbon sequestration, preservation of biodiversity, and other ecosystem services.

The users and beneficiaries that are monetizable and those that are harder to monetize are shown below in Figure 8.

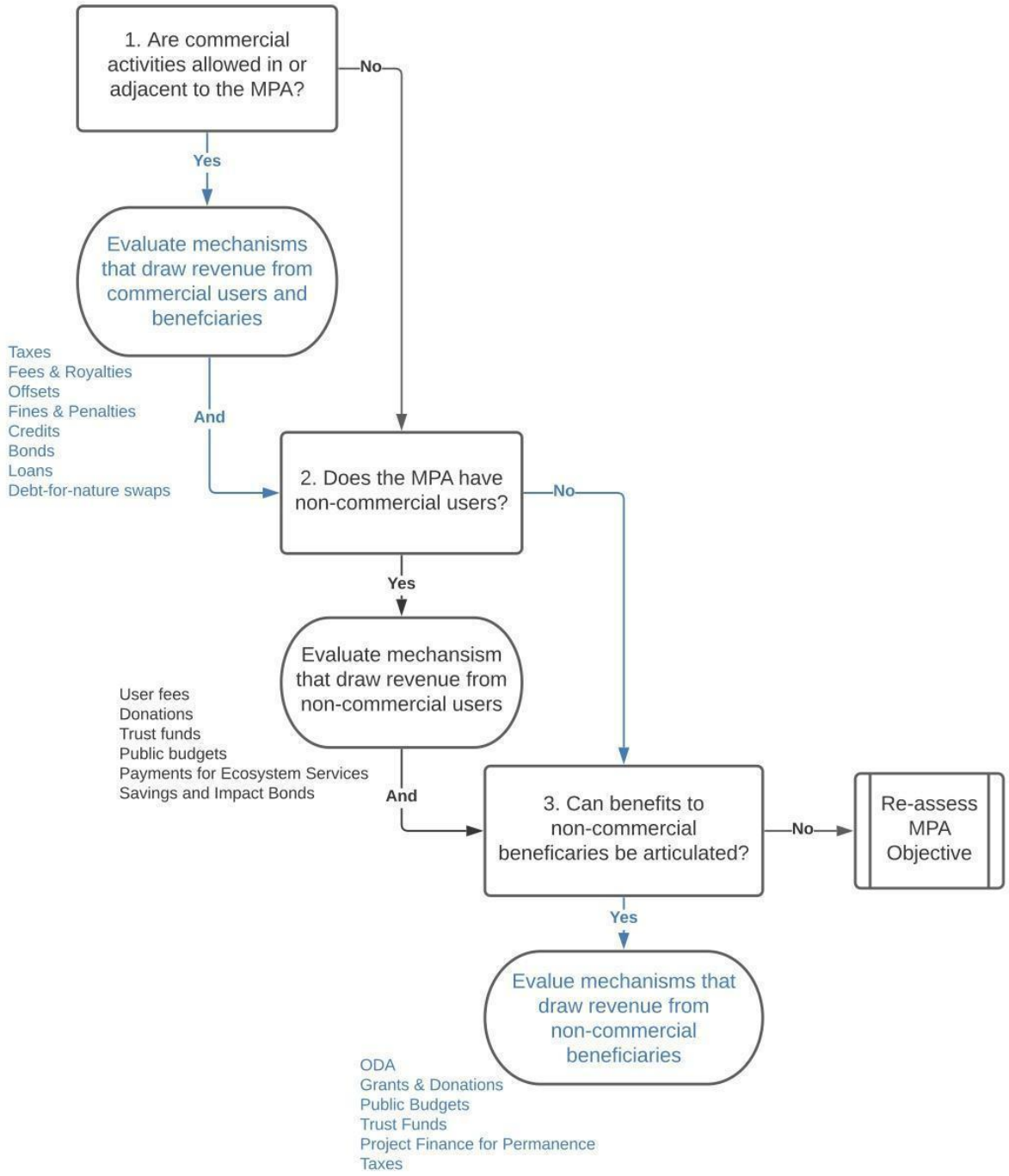
Figure 8: Users and Beneficiaries by ease of monetization



Finance Mechanisms

Given that the primary users/beneficiaries are non-commercial beneficiaries, the following finance mechanisms are potentially relevant (see Figure 9). These are further discussed below.

Figure 9. Finance Mechanism Screening – Case Study 3



The decision tree highlights the same finance mechanisms for Case Study 3 as Case Study 2. The application of these mechanisms, however, is slightly different. No-take HMPAs are the most difficult to finance. They are missing many of the commercial activities and direct users which are easier to monetize. The importance of protecting these areas, however, is absolutely essential. Therefore, creativity is required to find sources of funding to cover operational costs. It is recommended that a global fund for HMPAs be developed, rather than tackling funding for each HMPA individually.

Global HMPA Fund Designation and Governance

This global fund will need to be designed in close coordination with the ongoing ABNJ negotiations.

An international organization will be needed to lead the effort. The UN could take a lead role in such a fund, helping to bring parties together, assisting in the development of agreements, etc. Lessons for the development and implementation of the global HMPA fund can be taken from previous monitoring, enforcement and cooperative efforts for other global common goods. For example, what management and disbursement mechanisms exist for global nuclear monitoring work and/or the global health fund; the Global Environment Facility (GEF) and Green Climate Fund (GCF) also likely have useful lessons to share. It is anticipated that, as with these previous cooperative agreements, a few countries will come together to lead the initiative and then others will join.

A global HMPA fund could manage inflows from several finance sources such as fees, taxes, offsets as well as government contributions from both developing and developed countries, paying in according to their ability to pay. Funds would then be distributed equitably across the HMPAs to cover costs based on a set of predetermined criteria. In addition, global cooperation and initiatives could be tackled under this infrastructure, including global monitoring & enforcement and data-sharing opportunities.

Bundling together several HMPAs/countries with similar risk profiles has the additional benefit of de-risking the fund. Bringing the users and/or beneficiaries of several HMPAs together can also help monetize benefits that are otherwise hard to monetize, such as carbon sequestration.

Global HMPA Fund Inflows - Commercial

Shipping sector fees, as described in Case Study 2, would be applicable to a global HMPA fund as well.

Monetization of fisheries spillover benefits, as described in case studies 1 and 2, is perhaps even more applicable to a global HMPA fund. The fisheries sector remains highly politicized, however, and it is likely to be challenging to positively engage with the sector. Developing an equitable fee tariff structure will be key. For example, all countries could pay based on their GDP which could allow access to fishing in the high seas, however not all countries are equal in their fishing efforts,

nor do they face many current restrictions. Fees or taxes for the fishing industry does not necessarily need to focus on extracting payment from the fishing industry directly, instead lobbying could focus on the redirection of current harmful fishery subsidies into HMPA conservation via the global HMPA fund as mentioned above. In addition, it might be easier to make the case for fisheries user fees to be used for fisheries related core activities such as regional or global monitoring & enforcement initiatives. Fees extracted from the fisheries industry could be earmarked for a special monitoring & enforcement fund, which if so desired could operate under the larger HMPA fund.

There is an interesting possibility to engage the insurance industry in a global HMPA fund. While parametric insurance products may be less applicable to the high seas as coastal MPAs, the insurance industry could participate at scale with high seas issues. For example, insurance companies are experts in understanding risks; it is in their self-interest, for example, to charge higher premiums for ships that are more likely to ground. While the insurance industry may not provide direct core funding for the global MPA fund, they could be a potentially strong partner to de-risk the fund and payouts as a whole.

It is important to note that for most industries, umbrella organizations already exist. Working with these umbrella organizations will be paramount to achieving wide-spread buy-in and critical mass. There might be potential to identify and work with such organizations to develop finance mechanisms whereby everyone within the aforementioned organization has to follow the same rules, such as compulsory fees or taxes.

Global HMPA Fund Inflows - Commercial

The global fund should also consider how to monetize contributions from governments around the world. This would require not only a new and smart international treaty, but it would also require a complex system to calculate equitable contributions from diverse countries. More developed countries, for example, may be required to pay a higher fee, structured as a percentage of GDP. Alternatively, the fee structure could be weighted by considering the proportion of the sustainable blue economy vs ocean economy as a whole, providing incentive for sustainable ocean activities. As another idea, nationally determined contributions under the United Nations Framework Convention on Climate Change (UNFCCC) could be shifted towards credits to the global fund. Whether these contributions could be mandatory, or voluntary is the subject of much debate. It is suggested that this be considered in the context of the ongoing ABNJ negotiations.

6. Conclusions

6.1 Coastal, Offshore and High Seas MPA Finance

All MPAs are constrained by funding, no matter where they are located. There are almost no examples of fully effective and sustainably financed MPAs in any environment. While finance for coastal MPAs is progressing and examples are emerging of successful financial tools and strategies. The work is slow and arduous, with extremely high transaction costs and deal closing times. While we found evidence that O/HMPAs may be even further behind in developing sustainable finance, we also found opportunities for O/HMPAs to jump ahead of coastal MPAs.

The size and remoteness of most O/HMPAs is both a blessing and a curse. While these areas are harder to access and therefore may have fewer illegal or harmful activities, they are also out of reach and therefore out of mind for most people. Articulating the connections and ecosystem services between these remote areas and specific populations or stakeholder groups will be essential for any finance mechanism. Due to the inaccessible nature of these places, there is also an opportunity for de facto protection and lowered management costs, allowing for a risk-based and strategic approach to compliance activities. In the coastal zone, stakeholders may enter, use, and damage the environment from many access points and compliance requires a large presence spread throughout the MPA. Coastal MPAs also have increased impacts from land; in fact, in many areas, land-based pollution impacts outweigh any in-water impacts.

O/HMPAs have fewer access pathways, as they must be accessed by large vessels and /or aircraft that may be more easily monitored. Access is also more likely to be attempted by large companies, rather than diffuse user groups. This provides opportunities for very targeted stakeholder engagement.

The degree of difficulty in financing OMPAs vs HMPAs is not straight-forward; HMPAs lack domestic ownership which challenges many finance solutions, whereas OMPAs tend to have more allowable activities and complex MSPs - which may increase finance options but also significantly drive-up costs. There is certainly no silver bullet, and more research, piloting and testing of finance solutions are urgently required.

6.2 Research needs

Establish a database of costs

Accurately assessing the costs to designate and operate O/HMPAs may be hampered by the lack of published precedents and by the highly variable nature of O/HMPA management needs. While we searched in the literature and through stakeholder interviews for rules of thumb, standards, and even relative importance of various cost drivers, the only consistent answer was “it depends.” Sometimes, the remoteness of an O/HMPA contributes to exorbitant costs through expensive and slow transportation and personnel time. Yet in other instances, remoteness can contribute to the protection of the O/HMPA, reducing the need for interventions. As more and more O/HMPAs are

costed, a database of cost estimates and actual expenditures should be built, paving the way for fine-tuning of the theoretical cost drivers, developing rules of thumb, and eventually developing cost models which will allow managers to input MPA attributes and output cost estimates.

Stronger ecological models to establish benefits and connections to other locations
There is a strong theoretical basis to connect O/HMPA benefits to remote and distant beneficiaries, but there is a noticeable lack of specific, real-world, and quantitative estimates of these spillover effects. Research is urgently required to document and quantify the magnitude of benefits that specific target groups receive from O/HMPA protection, including but not limited to fisheries benefits, carbon capture and atmospheric cycling, habitat for migratory species - some of which are commercially- and artisanally- important, existence value of marine bioceuticals, and provision of marine biodiversity.

6.3 Management decisions

Cost efficiencies
Increasing cost-efficiencies and reducing the funding gap is an essential yet often forgotten step. For O/HMPAs there is large, to-date untapped potential in using technologies such as satellites, drones, and underwater acoustics for conducting remote surveillance and science at a reduced cost. Cost-efficiencies may also be found for remote LSMPAs that have economies of scale for many costs, including personnel, stakeholder engagement, etc.

Clearer communication with stakeholders to increase willingness to pay
Due to their remote nature, O/HMPAs can be outside of the consciousness of local and global populations. While scientifically the values of O/HMPAs are globally significant and foundational to life on earth, these values may be less tangible to stakeholders and therefore the work to finance O/HMPA designation and operation is a harder task than it is for coastal counterparts. To tackle this challenge, it is imperative to strengthen the science and the advocacy around spillover benefits of HMPAs to adjacent nations, and on the quantifiable regional and global benefits provided by O/HMPAs.

6.4 Planning

Diversification of funding sources and mechanisms
For O/HMPAs that allow commercial activity, finance mechanisms should include at least one mechanism that is funded by a commercial user and/or investor, and at least one mechanism that is funded by non-commercial users, direct beneficiaries, and indirect beneficiaries. For no-take O/HMPAs, traditional trust funds that are capitalized by a variety of sources remain essential. Traditional user fees and fines also play an essential role in committing ocean polluters and impactors to paying for management. In most cases, innovative mechanisms should only be considered after strong, traditional mechanisms are in place to support core capacities. Many of the so-called innovative finance mechanisms (e.g., blue bonds) have limited applicability for O/HMPAs, but they may be highly relevant to a small proportion of O/HMPA (large-scale but well-regulated commercial activity). Blue loans and equity may have a growing role in funding and

incentivizing sustainable fishing, tourism, marine renewables, and other sectors, but global standardization and strong governance regimes are required. On the horizon, several emerging ideas for innovative O/HMPA finance include ocean oxygen-production credits, blue water carbon credits, and taxes on offshore and floating marine renewable platforms and floating sustainable cities.

Networks

Another perspective on O/HMPA finance is to consider O/HMPAs as part of networks of MPAs, not as individual or standalone MPAs. This is related to the point above about spillover benefits, but networks of MPAs that include O/HMPAs may be more successful at achieving financial sustainability. The network may be able to share costs across coastal and non-coastal MPAs, find cost efficiencies with scale, and allow for adaptive allocation of budget based on a risk-based approach, rather than a static budget for each MPA per year. The network approach would increase the stakeholders who are users and beneficiaries of the MPAs, thereby increasing potential donors and investors. Revenues from coastal MPA finance mechanisms could be shared with O/HMPAs as needed. This recommendation aligns with progress towards whole-domain ocean management and integrated ocean governance systems. There may be a role for the Pew Charitable Trusts to support such a network approach.

Without this network approach, HMPAs in particular will require significant support to achieve financial sustainability. Many conservation finance mechanisms rely on strong governance, and international agreements around ABNJ and BBNJ are still in negotiation. Politics and competing interests will make it difficult for government budgets to sufficiently cover HMPA costs. It is essential that a global fund for HMPAs, which combines revenues from both commercial user fees and domestic government commitments, be fully considered in coordination with the ABNJ negotiations. Rallying several donors together at the same time to commit to long-term funding of well-costed management interventions may be the best way to ensure that HMPAs go beyond “paper parks” to functional regimes that protect global treasures.

Ongoing financial planning

Finally, O/HMPA financial sustainability will require the commitment from all stakeholders to ongoing financial planning. Financial sustainability is not an endpoint, but rather a cycle of strategic and participatory planning. With a phased, iterative approach, O/HMPAs can re-assess costs and threats and global contexts change; decrease costs as new technologies emerge; learn from innovative conservation finance mechanisms being trialed in terrestrial contexts and adapt them to the ocean environment; determine which management interventions are most effective and therefore most worthy of limited resources; and stack layers of finance mechanisms upon each other to diversify and de-risk funding flows.

Achieving financial sustainability for O/HMPAs will not be easy, but protection of pelagic biodiversity and blue water ocean health is essential to life on earth.

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Appendix 1. Definitions of O/HMPAs

The term "**pelagic**" MPA is commonly used by the scientific community. Gubbay (2006) defines pelagic MPAs as "any marine waters, with their associated flora and fauna, that have been reserved by law or other effective means to protect part, or all, of the enclosed environment." However, stakeholder interviews revealed that, while the term is well understood by the scientific community, it may be inappropriate for managers, practitioners, and funders, particularly those in the private sector. Furthermore, the term is restrictive in its definition; "pelagic" is understood to refer to the water column and its associated flora and fauna, most notably migratory fish, but is not commonly used to include the benthos. As such, the term could be misleading in situations where MPAs include the seafloor, in particular to protect against deep sea mining. In short, the term pelagic is deemed too scientific and restrictive for the purposes of this study.

According to the literature, the term "**offshore**" MPA can be used to refer to MPAs that are either 1) at a distance from the shore (e.g., Calado et al, 2011; Hill et al, 2014; Arias et al, 2016; de Andrade et al, 2017), or 2) outside of territorial waters (e.g., Alemany et al, 2013; Borger et al, 2014). While stakeholder consultations confirmed an inconsistent use of the term, they also showed its usefulness in avoiding the limits imposed by the term "pelagic", as "offshore" could be used to include both the water column and the benthos. "Offshore" MPA is also more commonly used and understood by the finance and political community for those MPAs distant from shore, and was indeed the most commonly used across all stakeholders.

Two further definitions are worth noting as they appear within the literature and were noted by a few interviewees: **"open water"** and **"blue water"** MPAs. CEA Consulting (2019) defines a blue water MPA as "a spatially defined area of open ocean explicitly dedicated to the protection and maintenance of marine biodiversity, ecosystems and associated cultural resources, and is managed for this purpose" (CEA Consulting (ed), 2019). However, the terms "open water" or "blue water" were less frequently used by stakeholders interviewed. Usage is also more inconsistent: sometimes stakeholders would use it in a similar way to "offshore" and sometimes not, and the literature sometimes equates blue water MPAs with pelagic MPAs (see, for example, Gilman et al, 2020).

Another commonly used term is **"High Seas**" MPAs, which brings in an important jurisdictional dimension as it is used to refer to MPAs that are situated in ABNJs, i.e., areas outside of territorial waters (situated within 12 nautical miles of shore) and EEZs (situated within 200 nautical miles of shore; Day et al, 2020). The Marine Conservation Institute (2020) describes the high seas as "the vast open ocean and deep seabed areas found beyond any country's national jurisdiction". Stakeholder interviews also noted that the term is increasingly used by the finance community and is more familiar to funders than "pelagic".

The definition used in this study: Although initially a single definition was preferred, the reality is that one 'all-encompassing' definition is not viable across all remote MPAs, particularly as it relates to financing. No single definition exists within the literature to define remote, offshore, predominantly pelagic MPAs. Nor does the literature specify exact criteria for those MPAs with

100% ‘offshore’ status vs. those with some coastal areas, although for all some majority of pelagic status is assumed. In addition, various stakeholder groups showed different preferences as to the appropriate terminology, as noted above. This has made selecting an ‘ideal’ definition more challenging.

After extensive research and input from the stakeholder community it was decided that Offshore MPAs (OMPA) would be the most appropriate terminology. It is the most consistently used, and that which is best understood by the finance and political communities. It is also not limited in its biological boundaries and can encompass both the water column and benthos. However, we do vary from (some) previous definitions in that we choose to define **‘offshore’ as those MPAs within national jurisdictions only.**

In addition, over the course of the stakeholder interviews it became apparent that, irrespective of the wide variation in these MPAs, jurisdictional boundaries - and any respective property rights/governance structures - is the single most significant determinant in designing any potential MPA financing solution. Government finance will remain a crucial element in financing national MPAs today and in the future - but for MPAs situated in the High Seas no overarching governance structure exists, and thus public finance options will be more limited than for MPAs within national boundaries. Financing solutions for MPAs within the high seas will instead require global cooperation and governance agreements and should be designed in alignment with on-going ABNJ negotiations. As such, very different financing solutions (and governance of) will be available to MPAs within a country’s EEZ and MPAs in the high seas. To denote **MPAs that fall outside of a country’s EEZ, we will use the term High Seas MPAs.**

To conclude, this study will use two terms: **offshore and high seas MPAs** (**OMPA** and **HMPA** respectively, **O/HMPA** when referring to both), addressing financing solutions for each category separately. This will help target audiences in both the scientific community, the finance community, the political community, and MPA practitioners.

Appendix 2. List of O/HMPAs

MPAs that fall within the scope of this study	Year established	Total Area (km2)	No-take Area (km2)	Nation or Authority
Great Barrier Reef Marine Park Authority	1975	345,000	115,000	Australia
Galapagos Marine Reserve	1998	133,000	47,000	Ecuador
Macquarie Island Marine Reserve	1999	162,000	58,000	Australia
Pelagos Marine Sanctuary	2005	87,492		France, Italy, Monaco
Phoenix Islands Protected Area	2006	408,250	408,250	Kiribati
Marianas Trench Marine National Monument	2009	246,608	0	United States
Prince Edward Islands MPA	2009	180,000	4,440	South Africa
South Orkney Islands Southern Shelf MPA	2009	94,000		CCAMLR
Charlie Gibbs North High Seas MPA	2010	178,651	0	OSPAR
Altair Seamount High Seas MPA	2010	2208		Portugal - seabed. OSPAR - water column
Antialtair High Seas MPA	2010	2208		Portugal - seabed. OSPAR - water column
Josephine Seamount Complex High Seas MPA	2010			Portugal - seabed. OSPAR - water column
Rainbow Hydrothermal Vent Field MPA	2010			Portugal - seabed. OSPAR - water column

Hatton Bank SAC	2010			UK - seabed. Water column - unprotected
Hatton-Rockall Basin	2010			UK - seabed. Water column - unprotected
Mid-Atlantic Ridge north of the Azores High Seas MPA	2010			Portugal - seabed. OSPAR - water column
Milne Seamount Complex MPA	2010			OSPAR
Chagos (British Indian Ocean Territory) MPA	2010	640,000	545,000	United Kingdom
Charlie Gibbs South High Seas MPA	2010	145,420	0	OSPAR
Motu Motiro Hiva Marine Park	2010	150,000	150,000	Chile
Marine Parks of Glorieuses and Mayotte	2010, 2012	110,000		France
Marae Moana Marine Park	2012	324,000	0	Cook Islands
South Georgia & South Sandwich Islands MPA	2012	1,000,700	20,431	United Kingdom
Pacific Remote Islands Marine National Monument	2014	1,270,000	1,270,000	United States
Natural Park of the Coral Sea (New Caledonia)*	2014	1,368,806	28,000	France
Nazca-Desventuradas Marine Park	2015	297,518	297,518	Chile
Palau National Marine Sanctuary	2015	500,000	0	Palau
Pitcairn Islands Marine Reserve	2015	834,334	834,334	United Kingdom
Rapa Nui Rahui MPA*	2015	631,368	496,570	Chile
Papahānaumokuākea Marine National Monument	2016	1,508,870	1,146,565	United States
St Helena Marine Protection Zone	2016	445,000	0	United Kingdom
Terres Australes Françaises	2016	673,000	120,000	France

Diego Ramirez-Drake Passage (Cabo de Hornos) Marine Park*	2017	137,000	137,000	Chile
Juan Fernandez Marine Park*	2017	480,000	480,000	Chile
Micronesia MPA	2017	184,948	0	Micronesia
Revillagigedo National Park	2017	147,629	147,629	Mexico
Ross Sea Protected Area	2017	1,549,000	1,117,000	CCAMLR
Tallurutiup Imanga/Lancaster Sound National Marine Conservation Area*	2017	131,000	0	Canada
Argo-Rowley Terrace Commonwealth Marine Reserve	2018	146,003	36,050	Australia
Coral Sea Commonwealth Marine Reserve	2018	989,842	238,400	Australia
Lord Howe Commonwealth Marine Reserve	2018	110,126	9,273	Australia
Norfolk Commonwealth Marine Reserve	2018	188,444	41,661	Australia
South-west Corner Commonwealth Marine Reserve	2018	271,833	54,841	Australia
Pacífico Mexicano Profundo	2018	436,147	deeper than 800m	Mexico
São Pedro e Sao Paulo Environmental Protection Area	2018	384,562	0	Brazil
Trindade e Martim Vaz Environmental Protection Area	2018	403,845	0	Brazil
* These MPA are not yet implemented as per the MPA Atlas (Accessed August 2020)				
** Included in Maxwell et al (2014) as Australian Commonwealth Marine Reserves, Australia, 2012, 1999, total of 3,100,000 km2				

Appendix 3. Documenting and Modelling O/HMPA Costs

Documenting O/HMPA Costs

An assessment of the costs for achieving O/HMPA management plan objectives is the first step in any financial planning exercise (Binet et al, 2015b). However, a recent study by Bohorquez et al (2019), analyzing costs incurred by terrestrial protected areas and MPAs, found that current protected area cost data and statistics are insufficient to answer basic questions about protected area costs and funding needs on a technical level.

Stakeholder interviews identified a few reasons for this:

1. Very few O/HMPA-specific cost studies exist.
2. No standardized templates exist.
3. There is often a lack of independent MPA budgets as MPA agencies are often nested within other agencies, making direct budget lines hard to extrapolate.

For future O/HMPA cost documentation and budget development, Binet et al's (2015b) MPA financial planning documents are worth highlighting. Binet et al (2015b) sets out a useful process for planning (future) costs:

1. Identify O/HMPA main programs and management activities.
2. Identify resource needs and costs for each management activity (i.e., the functional component monitoring & enforcement is expressed in terms of budget items: personnel, equipment, fuel costs, etc.).
3. The timeframe of budget items should also be classified. Many are annually recurring such as personnel costs, while others may be 'one-time' purchases which require replacement every *n* years as well as annual maintenance costs.

In addition, it is useful to also (where possible):

4. Develop O/HMPA budgets (and MPAs more generally) separately from other activities/ministries, BUT DO:
5. Record all in-kind contributions from other ministries/agencies. This will give a more accurate depiction of true costs as well as highlight collaborations.

Binet et al (2015b) provide useful templates to itemize and record costs/generate cost budgets. For a full methodology please see: Binet, T., Diazabakana, A., Laustriat, M., Hernandez, S. (2015b), Sustainable financing of MPAs in the Mediterranean: a guide for MPA managers. Vertigo Lab, MedPAN, RAC/SPA, WWF Mediterranean. 76 pp.

Future Directions - Cost Modelling

Once detailed budgets have been documented for O/HMPA management, the next step would be to develop a cost model. A cost model forms part of a larger financial model that provides a framework that captures both the costs of providing ongoing conservation programs as well as the current and potential revenue and funding sources to cover these costs (CCIF, 2008).

The cost model should extrapolate costing information into a **detailed multi-year plan** based on current and future management plans; a minimum of five years is recommended but ten years is noted as ideal CCIF (2008) - particularly within O/HMPAs which may require longer project timeframes.

As costing data can often be based on estimates with numerous underlying assumptions, a range of costs are recommended (Adams et al, 2011). At least two costing analyses should be conducted:

1. **An Optimal Management Plan:** The full suite of activities and programs that would provide full and comprehensive management of the site.
2. **A Basic Management Plan:** The most essential or core costs must be covered at all times in order to effectively manage the site.

Cost model data should also be revisited periodically and updated based on changing costs, due to potential cost efficiencies and/or technological advancements, as well as changes to the management plan under an adaptive management regime.

Again, Binet et al (2015b) provides a comprehensive overview of how to carry out a cost modelling exercise. In addition, Chapter 6: Finance Guidelines of the recent report “Large-Scale Ocean Financing: The current and future development of financing for large-scale marine protected areas” (Andrews et al, 2020a) provides additional information on cost modelling within a wider framework for the development and implementation of financing for LSMPAs. These two documents are particularly relevant to O/HMPAs cost modelling.

As for actual precedents, currently few O/HMPA cost models exist, although costing data/budget data has been collected for a number of O/HMPAs. In addition, budget data is often limited to current activities as defined by available budgets and resources. It more often does not represent the true cost of an O/HMPAs management plan and/or activities required to fully manage the area. As such, financial gaps are often also under-reported.

Overall, sufficient cost data/cost modelling resources exist for O/HMPAs; indeed, each cost model is tailored to site context and this will be no different for O/HMPAs than for other MPAs. However, developing a cost model can be a timely exercise and requires some financial savvy. With sufficient training, it should be accessible to finance officers. In the future accurate budgets and cost models should be developed alongside management plans.

Appendix 4. Finance Mechanism Feasibility Questions

After using the decision tree screening tool from 4.3, a site-specific feasibility analysis is required to select and design specific finance mechanisms (MPA Finance Principle #9, Section 2.1). Several tools and questionnaires are available in the literature to guide this process including CBD (2007), Bos et al 2015, UNDP Finance Scorecard (UNDP, 2018), Andrews et al (2020a), and FOA (2020). These guides share the commonality of screening mechanisms by multiple criteria including ecological, social, economic, legal, and others. Building upon these references, fifteen finance mechanism selection questions have been compiled below.

#	Category	Question	Notes
1	Scale	What level of funding can the finance mechanism generate?	Will it generate, leverage, save or realign a large or small volume of financial resources? Will it generate any financial return? (UNDP, 2018).
2	Timing	What stage of MPA development provides the best fit for the finance mechanism?	The O/HMPA would benefit from starting with low-risk funding such as donor funding or government funding (if available) to establish a solid financial basis, before moving on to less-tested innovative mechanisms.
3	Mobilization timeline	How long will it take to mobilize financing resources through the finance mechanism?	For instance, the Seychelles blue bond took three years to set up; while grant funding can be accessed faster (UNDP, 2018). This will feed into (2).
4	Longevity	Can the finance mechanism be counted on for years ahead, or is funding constrained to a certain period?	For instance, grant funding often lasts for a period of time only; while trust funds are set up with a long timeframe.
5	Cost of implementation	What are the costs associated with setting up the finance mechanism in the first place?	This will be related to (3) - the more time required to set up the finance mechanism, the more resources needed. Includes e.g., regulation, stakeholder engagement, and political buy-in (Andrews et al, 2020a). If costs are too high when put in relation to the expected scale of funding, the finance mechanism might not be a good fit.
6	Operational costs	What are the costs involved with operating the finance mechanism?	Consider, for instance, the costs involved in running a user fee system, where fees must be collected and managed, sometimes on a daily basis.

#	Category	Question	Notes
7	Risk of diversion	Is there a risk that funds	For instance, if tourism user fees are first channeled

		mobilized through the finance mechanism does not reach its end goal?	into central government, there is a risk some of the revenue is not used for its intended purposes unless regulation is in place and adhered to (Andrews et , 2020a).
8	Polluter pays first	Has a "polluter pays first" approach been taken?	As per Section 4.1, the finance mechanisms that mean polluter or investors pay should be chosen first, followed by finance mechanisms related to direct beneficiaries, and then indirect beneficiaries.
9	Incentives for more sustainable use / positive environmental impact	Does the finance mechanism improve incentives to manage marine resources sustainably?	The debate about biodiversity offsets, for instance, is relevant in this regard. Can they be seen as a way to encourage environmentally harmful behavior, and should therefore not be used? (Bos et al, 2015; UNDP, 2018).
10	Financial risk	What are the financial risks involved?	For instance, exchange rate fluctuations, lack of investors (UNDP, 2018).
11	Social risk	Are there any social risks related to the finance mechanism?	For instance, will the finance mechanism be seen as equitable? Will there be fair access to funds generated? (Bos, et al, 2015).
12	Regulatory / legal barriers	Will new laws and regulations be required to set up the finance mechanism?	If yes, this will impact costs and timeframe.
13	Stakeholder buy-in	Does the finance mechanism have the required support from stakeholders?	Stakeholders include beneficiaries, decision-makers, implementers, and investors. Additional costs might be involved in getting their support for the finance mechanism (e.g. user permits).
14	Capacity	Do MPA managers have sufficient knowledge and capacity to manage the finance mechanism?	Staff training or hiring of experts such as accountants might be needed.
15	External risk	Is the finance mechanism susceptible to external risks?	Risks can include political unrest, change of government, natural disasters, pandemics etc. The corona pandemic has meant that MPAs reliant on revenue from tourism user fees suffer, for instance.